JANUARY 1960

Volume 55 Number 1

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Complete New Baby Pig Reference
News Report—Midwest Nutrition Meet
Have You Diagnosed Canine Hemobartonellosis?

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1. Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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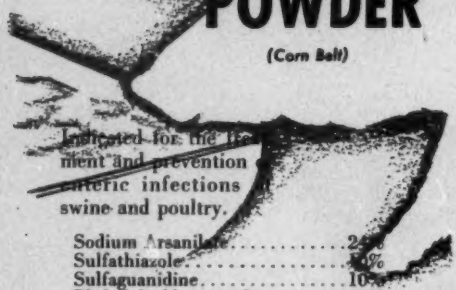

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VETERINARY MEDICINE

January 1960

Volume 55 Number 1

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V

News Comment

F.D.A. Policies

The F.D.A. is now adding pressure to the campaign launched in order to prevent food contamination. The decision against certain growth promoting chemicals was merely a signal of more to come. The zero tolerance for mastitis ointments containing penicillin edict came next. Presently, the F.D.A. is setting limits on the amount of antibiotics which can legally show up in meat tissue.

Studied analysis indicates that present policies will ultimately have the effect of forcing farmers to use drugs as prescribed. Meat with more than proper residue tolerances will be confiscated. By and large, in fixing residue tolerances the F.D.A. is paving the way for more favorable outcome of court battles. Whether these measures are to be considered a crackdown on farmers or not is moot. F.D.A. spokesmen merely point out that by making policy clear the enforcement tools can operate more efficiently.

Nature's Own Antifreeze

Recent studies by biochemists of the University of Minnesota on hibernating larvae of woodboring beetles have shown glycerine to be nature's own antifreeze. In efforts to isolate the enzymes that digest the cellulose on which insects live, biochemists found on analysis that the isolated liquid was glycerine. Further studies showed that active summer larvae did not contain glycerine.

To prove their theory, the biochemists collected large quantities of hibernating adult black carpenter ants. Glycerine content was found to be as high as 10%, but became almost negligible when body heat was increased. On chilling the ants for a few days at a temperature just above the freezing point, the glycerine content was fully restored. Ants of the same species found in warmer Maryland had no glycerine,

but on transplanting to the colder climate of Minnesota, they too secreted glycerine as protection to the lower temperature.

New Oral Antibiotic

Humatin, a new oral antibiotic, was more than 75% effective in treatment of certain bacteria-caused cases of infectious diarrhea, according to Dr. C. D. Godenne of Johns Hopkins University. Humatin, developed by Parke, Davis & Company, was studied in 55 infants and children, ranging in age from one day to seven years.

The product was administered in four divided doses daily and discontinued after six days of treatment. "In groups of diarrheas due to typhoid or dysentery organisms, 76% improved clinically after four days of treatment. In groups where no pathogens were seen, 90% improved clinically. In all patients, the drug failed to show any toxic effects."

Zero Tolerance

United States Pure Food and Drug regulations state that no antibiotics (zero tolerance) can be present in milk entered into the consumer market. Throughout the country, the natural upshot is that milk markets are now refusing to accept anything but milk with zero tolerance. Needless to say, the life blood of the dairy industry is at stake.

The problem has been given particular attention of late not only because of the cranberry fiasco, but chiefly because of this inventory of facts: Milk from only one cow's quarter treated for mastitis can cause a positive reaction in 35,000 lb. of milk when tested for inhibitors by the T.T.C. test, the test commonly used by federal, state and city public health officials.

Only one herd owner who treats his cows for mastitis and sends the milk from his treated animal to the dairy plant can adulterate an entire tank load of milk. He may even jeopardize the entire milk outlet for a dairy plant.

The solution is up to the dairyman. He must not ship milk to dairy plants until 72 hours (six milkings) after a cow has been treated for mastitis with any antibiotic. He must not ship to dairy plants from any cow treated for any disease with any method of antibiotic treatment --intramuscularly or intravenously--until seven milkings after treatment.

--Animal Health News

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Here each month are published ideas, suggestions and comments picked up by VM reporters at veterinary meetings.

The Meeting Circuit

Penicillin in Milk

Of the antibiotics used as intramammary infusions, penicillin in sufficient concentration is believed to be the only hazard to human beings consuming the milk drawn within three days after treatment. The reaction in some susceptible persons is anaphylactic. There does not appear to be a comparable hazard when the tetracyclines, bacitracin, neomycin or polymyxin B are used.

Complicated Milk Fever Cases

Treatment of the milk fever case that looks better after administration of calcium solution but fails to get up continues as a thorny practice problem. We generally think of metritis, mastitis, fractures, nerve injuries and lymphocytomatosis when faced with these problems. Dr. William E. Boucher, University of Pennsylvania, reported on investigations of another potentially important causative factor at the recent Southern Veterinary Medical Association meeting. He described cases in which the animal would try to get up but could only scramble. On examination of the legs nothing is noted early but a ridge may be seen later over the gastrocnemius muscle.

These cases are raised for examination. There is generally knuckling of the fetlocks and some ability to bear weight. Proteinuria is a constant finding. Treatment consists of lifting with a hip lifter for one-half hour intervals once daily for one to four days. More severe cases may require two to four weeks. Later a little assistance or tail lift is all that is required. Complete rupture of the gastrocnemius muscle has been found to occur.

Some of these cases may refuse to get up in front only. A cast has some possible merit for knuckling of the fetlock in such cases.

Necropsy shows muscle degeneration, commonly involving the ligamentum teres and the gastrocnemius. It is a degenerative necrosis. There is general parenchymal damage also.

Doctor Boucher explained that in many ways the condition resembled a condition studied at the University of Minnesota, but the muscle damage has not been reported. While etiology remains a mystery, an important new field for investigation is suggested by these studies.

Unusual Cases

Dr. Marvin Jacobs, Chestertown, Maryland, reviewed the following unusual cases before the Southern Veterinary Medical Association in Baltimore in November 1959.

A swine operation feeding ship sweepings had a number of gilts with enlarged vulvas. A green mold was found on the corn which causes estrogen activity as reported occasionally from the cornbelt.

In another swine operation the sows became sick 24 hours after farrowing. Temperatures were high and there was some vaginal discharge. The pigs died. Antibiotics helped very little and a Pseudomona infection was eventually established from the uterine discharge which was found to be sensitive to Neomycin.

About 8% of sows were sick with this strange condition which was brought under control by giving three doses of Neomycin intramuscularly—the first 24 hours before farrowing, the second 24 hours after farrowing, and the last 48 hours after farrowing. While Neomycin is not generally recommended for parenteral use it worked well in this case.

There never was any trouble with the gilts. No one boar could be incriminated. There was a mud hole in the sow lot, but the source of infection has never been established.

Another unusual case involved a cow that was poisoned. They had closed the barn and proceeded to use a fog sprayer. One cow was dead and others sick. Although the insecticide can stated, *do not use on cattle,* it would sure be helpful if labeling of toxic chemicals were more complete. Professional exterminators should also leave their address and an antidote.

Tailbleeding has proved to be quite practical for brucellosis testing, but some problems can arise. Tail paralysis has been encountered due to the owner applying excessive tail restraint.

Genital Infection

In the November issue of VETERINARY MEDICINE, a Virginia practitioner presented a case report involving a Standardbred stud with a genital infection of hemolytic *Staphylococcus aureus.* Although the condition had been recognized for only four months, it could have been present longer. The veterinarian in charge noted that the health and blood picture was excellent.

Although massive doses of penicillin-streptomycin and later sulfamethazine (1 gr. per pound body weight the first day and ½ gr. per pound for the next two days, with treatment repeated in two weeks) were alternately tried, no apparent drops on sensitivity plates resulted.

Erythrocin Lactobenate (Abbott), 1 gm. every second day for four treatments resulted in decrease of colonies to a very few in two weeks. Since that time the colonies increased and sperm count dropped. Sperm count was about 20 million per cc. before various treatments. After treatments sperm count dropped to 1 million per cc.

In response to an appeal for suggestions, Dr. R. A. Grant of Wyoming, Illinois suggested the following: "Use repeated doses of Staphylococcus aureus toxoid (Pitman-Moore) injections."

Frozen and Non-frozen Semen

In the artificial insemination of cattle the use of frozen semen is available any day of the year that it is needed. The non-frozen product is not always available, especially from much desired sires. There is some evidence that the addition of 10% glycerine to the skim milk diluent may in a measure overcome the disadvantages of non-frozen semen. On the other hand, non-frozen semen is less costly, and the conception rate is at least somewhat better than when it has been frozen.—*R. R. Dykstra, D.V.M.*

World Health Conference

It was emphasized by several speakers at the Second National Conference on World Health in Washington last month that food is one of the prime essentials for good health and well being. As health programs progress, infant mortality falls and people live longer. The population of the world is increasing at an unprecedented rate, and the production of sufficient food in decades to come will be a prime problem.

Food production must multiply all over the world to meet future needs. The significance of this to the veterinary profession, and its responsibilities with particular respect to protein foods of animal origin

should be obvious to all.

Another important point made by several participants in the Conference was the fact that communicable diseases, including zoonoses, are still the scourge of many countries. Progress depends upon effective control of disease. This was expressed quite forcefully by Mr. Leo Cherne, Executive Director, Research Institute of America.

" . . . It is important that we recognize that military and economic progress cannot be separated from the physical strength and vitality of any people. Effective economic aid requires a reasonably healthy work force.

"Tuberculosis kills more than a half-million Indians a year. This disease alone costs this nation almost a billion man-days lost work per year. And, this at the very same time that Communist China has mobilized its entire population on a 14-hour day slave-labor program, seven days a week—two hours, two nights a month off to see their wives. Almost half the people of the world . . . are in underdeveloped areas which means well over a billion human beings rarely, if ever, in their lives have a physician to treat their ills. They live in discomfort and agony until they die—many of them from the most minor illnesses or any of a hundred complications which flow from the most common simple ailments. . . . "

A program of international research for health can have far-reaching benefits for all peoples, inclunding Americans. Research is often most productive when carried out in the country where a problem exists. Interest, knowledge of the problem, ecological and epidemiological factors and experiences are found "on the spot." Intelligent, well-trained, and dedicated scientists may be found in all countries. Coordination of research and organized sharing of information gained on an international basis greatly speed over-all progress.

Voluntary organizations are effective in world health. They have more freedom of action, moving faster and more directly than governmental agencies without the restrictions and political factors which can serve to impede the latter.

Private industry is interested in health for peace, not only from a humanitarian point of view, but also from enlightened self-interest. The pharmaceutical industry in the United States is playing an important role in international health research. It spent $190 million in 1959 on research and development in the medical field. Millions have been spent in developing international production facilities for pharmaceuticals in countries where "these facilities make a big difference, such as India, Thailand, Brazil, Argentina, and other countries in which medical activities and facilities are not up to the standard needed for the successful completion of this health crusade."—*Joe W. Atkinson, D.V.M., Conference of Public Health Veterinarians.*

Organized Disorganization

Looking over the VM schedule of winter veterinary meetings, a friend inquired if the number of veterinarians was approaching the 100,000 figure. In view of the overwhelming list of meetings, it was a little difficult to explain that we had to scratch to round up 20,000.

I first started to explain that this peculiar phenomenon reflected the well organized nature of our profession but in midstream I suddenly realized that I had crawled out on a limb and was in the process of sawing it gently but surely off. How in blue blazes could I explain how 10,000 practicing veterinarians managed to finance and attend almost a dozen major veterinary meetings a month, the year around, and still find time to practice.

I finally gave up and confessed that this situation appeared to represent a high state of organized disorganization. In pondering the problem further — estimates of speaker costs, hotel expenses, time away from practice — recent discussions of proposed new organizations struck like a blow to the solar plexus. Isn't it about time to give some thought to a complete reversal pointing toward consolidation of veterinary organizations before we splinter a small profession into minute fragments that will be lost in the sawdust on the barroom floor?

Why wouldn't the established AVMA Regions provide an excellent starting point? If the states in any one region could see fit

to pool their budgets and put on one whale of a good meeting, it could make possible far greater utilization of money and efforts. Sufficient time could be allowed on the program for individual state business meetings and specialty sections. No earth shaking legislation would be involved. If the states in any one region could get together, a substantial improvement of programing could be attained with a minimum of effort and no increase in cost. The many exhibiting companies would be overjoyed as the personnel requirements to cover the present meeting schedule is enough to strain purse strings without even mentioning exhibit fees. Why not bring it up at your next local meeting?

Veterinary Calendar

Jan. 6-8. **New York State Veterinary College,** Cornell University, 52nd annual conference for veterinarians. Cornell University, Ithaca, New York. Dr. George C. Poppensiek, dean.

Jan. 10-12. **Kansas Veterinary Medical Association,** 56th annual convention. Broadview Hotel, Wichita, Kansas. Dr. M. W. Osburn, secretary-treasurer.

Jan. 10-12. **Tennessee Veterinary Medical Association,** annual meeting. Noel Hotel, Nashville, Tennessee. Dr. H. W. Hayes, 5009 Clinton Pike, Knoxville, Tennessee, secretary-treasurer.

Jan. 10-12. **Arkansas Veterinary Medical Association,** annual meeting. Hotel Marion, Little Rock, Arkansas. Dr. H. M. Goins, Berryville, Arkansas, secretary.

Jan. 11-12. **Nevada State Veterinary Association,** annual winter meeting. Riverside Hotel, Reno, Nevada. Dr. Brian L. Hutcherson, 2490 South Virginia, Reno, Nevada, secretary.

Jan. 13-15. **Indiana Veterinary Medical Association,** annual convention. Hotel Severin, Indianapolis, Indiana. Dr. L. M. Borst, 3315 Shelby, Indianapolis, Indiana, secretary.

Jan. 20-21. **Michigan State University,** 37th annual postgraduate conference for veterinarians. College of Veterinary Medicine, Michigan State University, East Lansing, Michigan. Clayton Wells, conference consultant.

Jan. 21-23. **Intermountain Veterinary Medical Association.** Hotel Utah, Salt Lake City, Utah. Dr. R. A. Bagley, 4600 Creek View Drive, Murray, Utah, secretary-treasurer.

Jan. 25-27. **Minnesota State Veterinary Medical Society.** Hotel St. Paul, St. Paul, Minnesota. B. S. Pomeroy, College of Veterinary Medicine, St. Paul 1, Minnesota, secretary-treasurer.

Jan. 26-27. **Short Course for Louisiana Veterinarians.** Pleasant Hall, L.S.U. Campus, Baton Rouge, Louisiana. Dr. R. B. Lank, Department of Veterinary Science, LSU, chairman.

Jan. 27-28. **North Carolina State College,** 22nd annual veterinary conference joint meeting with North Carolina Feed Industry. College Union, Raleigh, North Carolina. Dr. E. G. Batte, School of Agriculture, Raleigh, North Carolina, program chairman.

Feb. 1-2. **Oklahoma Veterinary Medical Association.** Biltmore Hotel, Oklahoma City, Oklahoma. Dr. W. F. Irwin, 3550 South Peoria Avenue, Tulsa, Oklahoma, secretary.

Feb. 1-3. **California Veterinary Medical Association,** midwinter conference. School of Veterinary Medicine, University of California, Davis. Kenneth Humphreys, 3004 Sixteenth Street, San Francisco, California, executive secretary.

Feb. 3-5. **University of Nebraska,** veterinarians' conference on swine repopulation. University of Nebraska, Lincoln, Nebraska. For program and registration form, write, Dr. E. Crosby Howe, Department of Animal Pathology & Hygiene, University of Nebraska, Lincoln 3, Nebraska.

Feb. 4-6. **Pacific Northwest Veterinary Associations' Conference.** Benson Hotel, Portland, Oregon. Dr. O. H. Muth, secretary-treasurer.

Feb. 4-6. **American Animal Hospital Association, Region 2,** annual meeting. Robert Meyer Hotel, Jacksonville, Florida. Dr. R. P. Knowles, 2101 N.W. 25th Ave., Miami 42, Florida, chairman.

Feb. 6-8. **American Animal Hospital Association,** Region 2, annual meeting. Hotel Robert Meyer, Jacksonville, Florida. Dr. Peter Roy, 4443 Atlantic Boulevard, Jacksonville, Florida.

Feb. 15-17. **Illinois State Veterinary Medical Association,** annual convention. Hotel Abraham Lincoln, Springfield, Illinois. Dr. C. G. Hostetler, 1385 Whitcomb Avenue, Des Plaines, Illinois, executive secretary.

Feb. 15-17. **Colorado State University,** 21st annual conference for veterinarians. College of Veterinary Medicine, Fort Collins, Colorado. (A short course in bull evaluation will be held Saturday, February 13, and Sunday morning, February 14.) Dr. O. R. Adams, Department of Veterinary Clinics and Surgery, Fort Collins, Colorado, program chairman.

Feb. 21-23. **The Missouri Veterinary Medical Association,** 68th annual meeting. Hotel President, Kansas City, Missouri. Dr. Paul L. Spencer, P.O. Box 283, Jefferson City, Missouri, secretary.

Jun. 27-29. **California Veterinary Medical Association,** 72nd annual convention. Jack Tar Hotel, San Francisco. Ken Humphreys, 3004 16th Street, Rooms 301-2, San Francisco 3, California, executive secretary.

This frank discussion by one of the feed industry's keenest minds pinpoints the drastic influence of changing agriculture on his industry and dramatizes the fundamental soundness of future veterinary and feed industry cooperation for those attending the recent Midwest Veterinary Nutrition Conference in Kansas City.

HOW FARM TRENDS AFFECT YOU

MAURICE JOHNSON

President
Midwest Feed Manufacturers' Assn.

Executive Vice President
Professional Feeds Division
Spencer Kellogg & Sons, Inc.
Kansas City, Missouri

IT WAS 15 YEARS AGO that a group of feed manufacturers got together in Kansas City to solve some of their problems in the midst of great adversity. They told the press and radio that feed manufacturers were respectable people, and were not responsible for depriving the farmers of feed that was needed during the war. As a result of that adversity, the Midwest Feed Manufacturers Association was formed. It has since become a large and progressive group.

It seems to me that adversity has again brought a group of people together. And the adversity is probably not felt by the veterinary profession nearly as much as it is by those of us in the feed industry. It is because of great tribulations that we are going through, many of them created by our own activity, that we have invited you to share our problems with us. We want to see whether we do not stand more firmly on the same common ground today than we have in the past. Your profession in North America was dignified about a 100 years ago at Guelph, Ontario with the establishment of a veterinarian school. The feed industry wasn't even a gleam

in anyone's eye at that time. It was not created until about 1895 and struggled along for about 15 or 20 years without having any stature at all, and only within the last five years has it become dignified, if you call it that, by having a school of feed technology established on one of the campuses. Yours is a much older, much more seasoned profession.

I suppose we are something like the electrical profession. There was no curriculum at any college in electrical engineering until Edison did something about it and wired New York City. There was no school for aviation until the Wright brothers found out how to fly. And there was no need for the veterinarians to be interested in formula feed until somebody made some of it.

Feed in Practice

It was quite some time after we started to make feed that you began to recognize that it might find a place in the practice of feeding animals. Now the tremendous growth of our industry and the wide and wild spreading of our industry out into feedlots and broiler production, mass egg production and other evidences of concentration of production, make our business your business and your business our business. It is high time we got together and told each other what our troubles are. We did not think we needed veterinarians 15 years ago because people who fed our feeds, fed so few hens and so few hogs that if they all died nobody really was hurt—just one person.

Now we feed so many hens, turkeys and cattle and swine at one time in one place that a mistake can wipe out a company influencing many families. You did not think you needed us when you were treating individual cases throughout your county. Now you see feedlots cropping up and from 1,000 to 70,000 cattle in one lot—fed in ways that you have never dreamed would occur. Suddenly, I believe, you realize that you must know our problems just as we must know your profession.

Feeding today is taking two directions. One is contract feeding with specialized production for a specialized market, and this can be started by the big feeder, by the feed manufacturer, by a local veterinarian or by a packer. It can be started by anyone and the ghost that comes up to frighten us is that when anyone else starts one they are likely to tag a feed mill onto one end of it and there goes our business.

Seriously, many of the large poultry feeders in California who have 100,000 to 250,000 chickens on one ranch, very quickly feel that they should be making their own feed. Many of the feedlots, perhaps most of the large feedlot operators, now build their own feed mills. One large turkey feed manufacturer told me last year that he was so proud of what he had done in the turkey business when he inspired one man to raise 150,000 turkeys over a period of five or six years. As this man grew in knowledge and ability, he got bigger and bigger—all the while being completely financed by this feed manufacturer. Last year he announced to his patron, the feed company, "I'm sorry Ed, but I'm going to build a feed mill," and there went 10% of his turkey business. So if we seem to make some foolish moves in the feed business as we flounder around trying to find our place in this new automatic feed age, it may be that some of us become desperate when we see others taking over our function or a function that we thought was ours.

There is also the other type of feeding that is done by the 40, 50 or 60% of the people who are employed in a city. It has recently been found that 40 to 45% of all so-called farmers in the United States have another job, 60 to 70% of all of the farmers in a seven county area around one city work elsewhere. What kind of farmers are they? You people know them better than we do. They are not seriously relying on hogs, chickens, dairy cows, or beef animals for their income. They do some of it as a side line and they continue as side-line operators. You have contract feeding on the one side and side-line feeding on the other. All of it acts as a supplemental type of feeding to the enormous year after year feeding prac-

tices that exist throughout the cornbelt, and you wonder if both of them will not make inroads into this historical feeding pattern.

Inroads are already being made in that area by a rather fantastic exodus of poultry from the middlewest. In one state alone in the middlewest, 27% fewer chickens are being placed this year than last year. Next year if the price of eggs stays where it is now, there'll be 27% less again and it won't be very long until that state has as few chickens as it now has horses and mules. Farmers do not have to have chickens. What will prevent other types of livestock feeding from leaving this same area? Let's pick off a few of the types of contract feeding and concentrated feeding that are developing and see what is happening in the various types of agricultural development.

Feedlot Problems

In cattle feeding, they are feeding much larger numbers. There are at least 3,000 and probably 5,000 feedlots in the United States today. At least twice, or maybe four times as many as there were five years ago. The largest cattle feeding state in the union is not Iowa, it is California. Iowa is now second. Nebraska is third. Colorado is very close and Florida is coming up fast. So are Georgia and Tennessee. Half of the cattle fed in the United States this year are being fed in feedlots. The average size of a feedlot in Arizona and California is about 8,000 or 9,000. According to the new magazine, *Feedlot*, 11,639,000 of the cattle fed this year are in feedlots. Who is doing this? In many cases the large successful cattle feeder himself. The packers are doing it both by contract and by direct feeding on their own. Some enterprising businessmen are doing it. All you have to do is to drive north out of Denver about 50 miles and you will be astonished to see that feedlots are packed up against each other, mile after mile, and at every one there is a feed mill or a type of feed mill. The packers are either doing it or they are taking from these feedlots the cattle they need. Many of the large feedlot operators are beginning to talk about putting up their own packing plant. Like the feed companies, the packers are seeing others get into their business and these others know a little more about procurement perhaps than the packer knows himself because they are the ones who are delivering the goods to the packer. Different types of feeding in feedlots are occurring. Cattle are being put on feed in 24 hours. They are being fed in self-feeders without roughage on the side. They are being mechanically fed silage, hay wafers, high roughage pellets, and they are being treated like chickens in a chickenhouse. The feed mills that feed these animals are often feeding the neighboring herds of beef cattle on a contract basis or on a straight cash basis. Where are these feedlots going to locate, are they going to follow the pattern I just described or are they going to go everywhere? The only place in the United States where they do not now exist, is in New England, and I guess they just don't want to have cattle up there. They exist in almost every other state. They either go to the location because of the market or the grain and roughage. In these feedlots they have a tremendous need for skilled help of the kind you are giving. I have here a nine page letter of instructions from one company to the manager of a feedlot on how to take care of the cattle. It is becoming a very difficult and tedious job to take care of cattle in concentration, and a veterinarian is mentioned in every page. In dairying, I am sure you all recognize the rather astonishing trend towards large numbers of dairy cattle.

Specialization

I am sure that many of you are familiar with the calf-type farms starting in some states, where people specialize in production of calves and move them into the large dairy farms. I am sure that you see the dairy concentration starting to move as the small farmers get out of the seven cow class and go to work in the city. The larger operators, often in other locations, are buying their cows and mak-

ing a business out of it. In studying this problem I called the Bank of America in San Francisco and asked for their vice president in charge of dairy problems, and said I'd like to know on what basis they loan money on dairy cows in California. He said they will loan 50, 75 or 100%. If a man has less than 30 cows, they loan him nothing. If he has from 30 to 40 cows they will lend him some, but if he gets up to 60, 80 or a 100 they frequently will go all the way. I think that speaks for itself.

The Health Problem

The health problems in these situations are tremendous. Contract feeding in the production of eggs has become rather a wild topic in the feed business in the last year or so. The marketing arrangements are interesting and the problems devastating. Concentrating 5,000 to 10,000 hens under one roof is a lethal problem, and not very many people have solved it. However, those in this industry who are hungry to replace the business that the typical farmer is abandoning are trying, losing, fighting and scratching to make it work. One company announced that it is starting a concentration of a quarter of million hens in the Jackson, Mississippi area. Another company said they are going to have 700,000 under their direct control in Oklahoma. The location of this particular activity seems to be moving in the same directions as broilers, moving south where chickens do better, eat less, are cared for by lower paid employees and where buildings don't cost as much. Contract broiler production is disappearing and the integrated production of broilers by the processor or by the feed manufacturer or by the hatchery is becoming standard. If you can save a quarter of a cent by producing your own broilers, you do it because you're financing yourself anyway.

Not long ago any person interested in raising turkeys would have ten feed men rush up to him and say, "Where are you going to do it and here's the money." Now, the feed men are beginning to realize from their financial statements, and other evidences, that if they are going to do it, perhaps they had better own these ventures. This is not always true but it is becoming a little more true every year.

There is enough evidence along this line to make us feel that we are going to see more and more of large control production of turkeys, broilers and eggs.

In swine this is not so evident. There is some contractural production of swine, but not much. It seems that the rather difficult life cycle of a sow and her progeny keeps the total production on one farm. But it does not mean that this will not change nor does it mean that it will stay in Iowa, northern Missouri or Illinois and Indiana. It means that as the science of producing swine develops, production itself will go to Colorado, the panhandles, and the areas that have the advantages of the market for this kind of production. Not as fast as poultry and feedlots, but there are compelling reasons for swine to be produced in places in addition to Iowa and adjoining sister states. The forces behind these developments are many. The desire of the feed manufacturer to sell feed is not the only one. The desire of the farmer to make more per head is important. The desire of the packer or processor to have a uniform product that he can depend upon, and the desire to cut every last mill off of the cost of producing a pound of any kind of livestock take their place in the discussion. The desire to maintain investments that are going begging for a product, such investments as the huge egg-breaking plants that are watching the flocks leave, packing plants in Omaha, East St. Louis, that are watching fed cattle in some cases move into other areas—all are factors. These investments are huge and the operators feel that they must do something to keep the production of livestock they need in an area where they can get it.

The Future

These are sobering things and they do not happen over night because they take so much money, manpower, plan-

ning and courage. Perhaps it takes more courage to stay out of it. If you stay out of it and watch the chickens disappear and watch the cattle go into the hands of others and watch the swine being fed by some other system, you see your own business disappear as the farmers change their directions. We feel very much like a company would feel in the electronic business without an electronic engineer when we do not have veterinary help in dealing with our problem. This was not true ten years ago, but we need qualified veterinarians now, because the number of animals we are either feeding or financing is so great, and so concentrated. We are in such a vulnerable position that we must have the trained individual there to do the job for us.

for abstracts of conference reports see page 80 . . . . . .

DISEASES OF BABY PIGS

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THE FULL MEASURE OF PROGRESS in swine practice becomes apparent when visualized against the background of the practices of an earlier day. Obviously, it would be impossible to discuss every disease condition of baby pigs, just as it is almost impossible to classify every disease. In developing this report, over 100 references have been consulted, and the full body of veterinary literature for the past eight years has been scrutinized. As a matter of simplification, diseases of baby pigs will be developed here essentially as one would develop an outline.

For simplification, the anemias will be discussed under the heading of simple anemias and hemolytic anemias.

Simple Anemia

Cause. A deficiency of copper and/or iron is the chief cause of simple anemia. If the anemia is due to iron deficiency, there is a decrease in hemoglobin synthesis. If it is due to copper deficiency, a shortened life span of the red blood cells is at once apparent.

Predisposing Causes. If newborn pigs have no contact with soil, this may predispose them to anemia

Incidence. The condition itself may develop from birth to eight weeks of age, but it is more often noted from the age of five days to three weeks.

Signs of the Disease. Affected pigs look "chubby" or over-fat. They appear dull, weak, and refuse to nurse. They may "thump" when breathing. Often a secondary pneumonia is associated with the condition, and anemia may be overlooked as the primary cause of illness. Pigs in the best condition appear to be the most susceptible. They look healthy, but lack vigor and stamina. When playing, the respiratory rate increases and the "thumps" are more noticeable. Pigs will stop playing and seem to try to "catch their breath," and act as if exhausted and bewildered. In advanced stages, pigs become stunted, develop a wrinkled skin, and rough hair coat. The mucous membranes are pale and some have a diarrhea.

Once the condition has advanced to the stage where pigs are stunted and have a rough coat, they may not recover, even with treatment. The skin condition is due to dehydration and the diarrhea may be due to secondary or unrelated disease processes. Fat, well nourished pigs may die suddenly from this disease.

When anemic pigs are compared with non-anemic pigs, the former will be noted to have pale or even yellowish snouts. The area immediately above the hoofs which is pink in normal pigs may be pale or yellowish in anemic pigs.

Without treatment, the mortality rate among pigs with anemia may vary from almost nothing to 60%. At necropsy, thin and watery "red ink" blood, excessive body fluids, pale, enlarged and flabby hearts, enlarged and fatty livers, and enlarged firm spleens are all common findings.

Diagnosis. A determination of the

hemoglobin content of the blood reveals it to be markedly below normal in hemoglobin values. At birth, hemoglobin values are 8 to 12 gm. per 100 ml. of blood. These values usually decrease moderately the first three or four days after birth. With access to iron and copper salts, the hemoglobin values rise, and may exceed birth values when the pigs reach two or three weeks of age.

In simple anemias, the hemoglobin values may fall to 2 or 3 gm. per 100 ml. of blood. Another diagnostic feature is a hypochromic, microcytic anemia that develops in affected pigs and may be demonstrated by a stained blood smear.

Treatment. Any one or any combination of the following treatments may prove effective.

1. Place clean sod in the corner of the farrowing pens.
2. Pens may be dusted with 2 lb. of iron sulfate and 4 oz. of copper sulfate mixed in 100 lb. of fine sand.
3. Give iron tablets or iron compounds orally. (The old treatment of ferrous sulfate 3½ oz. and copper sulfate, ¾ oz., dissolved in one pint of molasses and one pint of water and painted on the sow's udder is now generally discarded.)
4. The newer injectable iron compounds have proved very effective and may replace the foregoing recommendations; however, good clean sod still has definite advantages.

Prevention. All of the recommendations made under treatments may also be applied as preventive measures. Regardless of the appearance of the pigs, preventive measures should be adopted. It has been shown that "disease-free" pigs are not benefited by the administration of additional iron, and it has also been demonstrated that pigs may be harmed by too much iron.

Hemolytic Anemia

Cause. The exact cause is unknown. It seems to be a maternal iso-immunization, an isohemolytic disease caused by specific erythrocyte destroying antibodies obtained from the sow's milk. It may be due to serological incompatibility in the mating of certain sires and dams. If the blood cells of the dam are incompatible with those of the sire, fetuses *in utero* may sensitize the dam. Then when the pigs take the colostrum of the dam, a highly fatal antigen-antibody reaction takes place. It has been suggested that hog cholera vaccines of swine origin may occasionally produce a similar reaction.

Age incidence. Baby pigs may be affected from 12 hours to four days of age.

Signs of the Disease. Two forms of the disease have been recognized. In one form the pigs appear normal at birth, nurse well, then within 12 hours the entire litter may die. In the second form, deaths begin on the second or third day. How-

This comprehensive working reference will be concluded in future issues under the major headings of arthritis, enteric diseases, central nervous system involvement, respiratory diseases, diseases manifesting skin lesions and diseases of the sow causing abortion, premature birth or weak pigs. References will be included with each subject for the convenience of the practitioner. Requests for bound volumes of this complete series may be directed to VETERINARY MEDICINE, *Livestock Exchange Bldg., Kansas City 2, Missouri.*

ever, the disease may become evident as early as the first day. Icterus is evident in the skin and mucous membranes. A generalized weakness develops. By the fifth day all of the pigs may be dead. The icterus varies from slight to golden yellow or pink bronze. Body temperature may drop as low as 92 F. Mortality rate is almost 100%.

In the first form mentioned above, the tissues are pale and there is marked anemia with a low total blood volume at necropsy. Petechial hemorrhages are noted on the serous membranes and the spleen is dark, friable, and engorged with blood. The urine is normal in color and the stomach is full of whey or undigested curd. Hemoglobin values are 2 gm. to 3.2 gm. per 100 ml. of blood and the packed cell volume is 5 to 8%.

In the second form, icterus is noticeable in the intestines. The pigs appear normal in size and there is no evidence of malnutrition. The bladder is full of wine colored urine (from hemolyzed blood), or in acute cases the urine appears more yellow than normal. Anemia is pronounced. Focal and diffuse hemorrhages are found throughout the viscera. Milder cases exhibit only anemia, with little or no jaundice and few gross changes in the internal organs. The heart muscle appears anemic and the brain may be icteric, being stained with bilirubin. A quantity of blood stained fluid is present in the abdominal and serous cavities. The spleen and liver are enlarged and appear black. The liver may show fine mottling. The stomach may be filled with recently ingested milk. The kidneys are congested. When the blood is examined microscopically, the red cells are greatly altered in appearance and immature forms are present.

Diagnosis. The disease syndrome is similar to that seen in man and the equine species, and the same technics for diagnosis are employed. A "quickie test" has been used. In this test, several drops of blood from a suspect are placed on one end of a glass slide. The slide is tilted back and forth. Normal blood leaves a smooth red coat. In hemolytic anemia, numerous pin-head sized clumps of agglutinated red cells are spread like islands through the plasma on the slide.

Treatment and Prevention. There is no known treatment. If the condition is recognized in time, the pigs may be placed on a foster mother or reared as orphan pigs. If the disease can be traced to a certain boar, then obviously the boar should not be used for future breeding of affected sows.

Eperythrozoonosis

Eperythrozoonosis is frequently characterized as ictero-anemia, anaplasmosis-like disease, and yellow belly.

Cause. A parasite, *Eperythrozoon suis* is the cause of this condition. The parasite destroys red blood cells. Another species, *E. parvum* occurs in swine, but apparently is harmless.

Predisposing Causes. The disease occurs during warm weather and may be transmitted by blood sucking insects or unsanitary operative procedures. The disease is often found concurrently with hog cholera.

Age Incidence. This is a disease primarily of shoat age pigs and its inclusion here may be questioned. However, it has been reported as an "in-utero" infection of baby pigs.

Clinical Signs. Pigs become very anemic, weak, depressed, and lose their appetite. The temperature is elevated, ranging from 104 to 107 F. Labored breathing may be observed. Icterus is visible as a yellowing of the visible mucous membranes and the skin. Often, the icterus is readily noted along the underline of the belly (yellow belly). The feces become bile stained. The morbidity and mortality are usually low in shoats, but may be extremely high in suckling pigs.

The blood is thin and watery at necropsy. Icterus is often evident in the visible mucous membranes, skin, musculature, and viscera. The liver is yellowish-red in color, sometimes being mottled in appearance. The gall bladder contents are yellowish-green in color and viscid. If the neck of the gall bladder is severed and pressure applied on the bladder, the contents are expelled much in the same

manner as tooth paste from a tube. The spleen is markedly enlarged and soft. Sometimes ascites, hydropericardium, and a pale, flabby heart are observed. Petechial and ecchymotic hemorrhages occur on the lungs and petechial hemorrhages may be found on the kidneys, but such hemorrhages are not a consistent finding. Congestion of the lungs and even pneumonia occasionally occur.

Diagnosis. The disease can be diagnosed by demonstration of the parasite in stained blood smears in conjunction with clinical signs and necropsy findings. A low red cell count occurs with the disease. Microscopic lesions that may be demonstrated by tissue sectioning and staining are: hyperplasia of the bone marrow, hemosiderosis of the liver and some necrosis of the liver lobules.

Treatment and Prevention. Treatments that have been used with some success include neoarsphenamine given intravenously at the rate of 15-45 mg. per kg. of body weight as a single dose; or oxytetracycline or tetracycline at the rate of 3 mg. per pound of body weight; or Arycil (Winthrop) as a 5% solution giving ½ to 3 cc. by intramuscular injection every other day and repeated three to five times. Recovered animals may remain carriers for life and this fact must be recognized in any preventive program. Prevention and control should be directed toward keeping swine free from blood sucking and biting insects and using strict sanitary methods when vaccinating, castrating or performing other operative procedures.

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Use of Vitamin K

Frequent reports by veterinarians indicate a good deal of usage of vitamin K orally in the handling of so-called sweet clover poisoning in cattle and Warfarin poisoning in small animals. Both conditions are due to dicoumarin, an anticoagulant which results in reduced prothrombin activity in the blood. Small animals that have consumed Warfarin—a rodent poison—are treated with doses of 2.5 to 5 mg., and large animals are treated with as much as 10 to 20 mg. daily for a ten day period—less dosage and for a shorter period if coating returns to normal. Oral administration is reported as effective or even more so than the intravenous route.

Medical Relations

In an editorial in the September 12, 1959 issue of the *Journal of the American Medical Association* Dr. C. D. Leake is quoted as follows: "The medical profession can well afford to take the lead in seeking mutually dignified relations with the sciences and health professions to which it is allied." Continuing, the editorial calls attention to desirable relations and cooperation which would be helpful in such fields as dentistry, veterinary medicine, pharmacy, nursing and public health. All these professions have a worthy common purpose, and closer relations will promote good morale.

Fig. 1. Ewe near death. Note persistent position of head, paralysis of right ear and lips. Salivation was excessive. Culture of medulla was positive for *Listeria monocytogenes*.

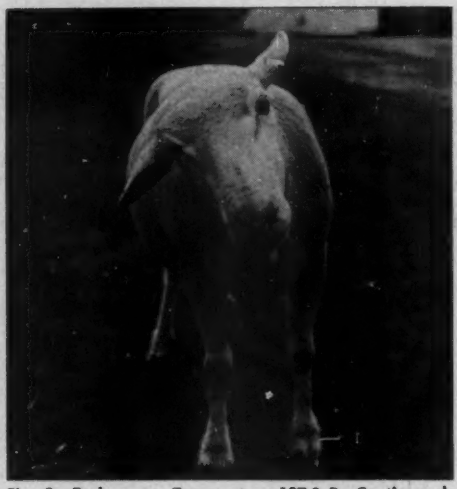

Fig. 2. Early case. Temperature 107.2 F. Continuously circled to right and refused to straighten head. Died within 72 hours of onset of symptoms.

LISTERIOSIS IN SHEEP . . .

LISTERIOSIS is a sporadic disease of sheep which manifests itself primarily as a fatal encephalitis, or less frequently by abortion in pregnant ewes. The purpose of this paper is to report an outbreak of encephalitic listeriosis in a breeding flock in Ohio. Sporadic outbreaks of a central nervous system infection suspected of being listeriosis have been observed in this flock since 1931. The first positive diagnosis with isolation of the organism was in 1942. However, no new cases had occurred since 1952.

Clinical Investigations

On January 11, a non-pregnant Columbia ewe was discovered in a comatose sternal position, unable to rise, and with partial paralysis of the head. Temperature was 106 F. No other clinical signs were evident. Because of previous outbreaks, listeriosis was suspected, but attempts to obtain a positive diagnosis were not made when the ewe died the following day. Chlortetracycline was given intravenously with no response. Necropsy findings were negative.

Thirty days later, a non-pregnant Merino ewe was discovered down and unable to support herself when placed in a standing position. The right eye was rotated dorsally, and not subject to voluntary control. The right ear was dropped and paralyzed, salivation was profuse and paddling movements were made with the feet. When placed in a recumbent position, left side down, the ewe would struggle and paddle until she attained a position with the right side down. Treatment consisted of 1 gm. of oxytetracycline intravenously and one million units of penicillin intramuscularly, repeated in 48 hours. The ewe was destroyed for humane reasons 96 hours after the first treatment. Paralysis had extended to nearly all structures of the head. Necropsy findings were

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Fig. 3. Advanced listeriosis. Note paralysis of ears, eyelids, cheek muscles, lips and jaw. Lamb was blind and unable to lift its head.

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A FIELD OUTBREAK

negative.

A third ewe, four days post-lambing, exhibited similar signs two weeks later and died within 72 hours. Necropsy findings were negative.

Five other ewes exhibited signs and succumbed within a period of 112 days from the time the first ewe was discovered. Variations in signs were observed. Four had already delivered lambs; one was not pregnant. Two ewes (figure 1) were near death when discovered, even though regular, numerous observations of the flock were made. Both were blind, paralyzed in the lower jaw and lips, resisted attempts to move the head from the flank position, salivated profusely, and had a mucous nasal discharge. Only one ewe (figure 2) exhibited signs of circling and torticollis. Two ewes had incoordinated gaits, but were able to move about, although they found it difficult to keep from running into objects. High rectal temperatures were common, except in the two advanced cases. Autopsy findings were consistently negative.

The first signs in lambs were seen April 10, and new cases occurred until April 27, affecting a total of eleven lambs. Only three were successfully treated. The development of signs in the lambs followed a consistent pattern. The earliest sign observed was the dropping of one ear, which was due to complete paralysis of that ear. Rectal temperatures ranged from 105 to 108 F. Otherwise the animal appeared normal and continued to eat and move about. Five of the eleven lambs revealed only these two signs, and three of these were the only survivors of the affected animals. The remaining cases were further advanced when detected. Treatment of all lambs was with large doses of long-acting penicillin intramuscularly.

From the ear, the paralysis spread to include the eyelids, facial muscles, mandible, lips, the opposite ear, throat, and the eyes,

Fig. 4. Early listeriosis. Temperature 106 F. Head returned to tilted position when straightened. Symptoms ceased in four days and recovery was complete.

Fig. 5. Early listeriosis. Lamb circled to left. Temperature 105.4 F. Note relaxation of neck muscles on right side. Left eye reflex was absent.

Fig. 6. Panophthalmitis in rabbit following instillation of one drop of culture containing organisms isolated from medulla of ewe in figure 1.

causing blindness (figure 3). The head frequently was tilted, and/or turned to one side, and could be returned to its normal position only with difficulty (figure 4). Nasal discharge, excess salivation, and gross incoordination occurred in some lambs. In the cases with extensive central nervous involvement, the animals lost their ability to use the feet and legs, became comatose, and died. The duration of signs varied from a few hours to several days. Two lambs were near death when found, although they had appeared clinically normal twelve hours previously. Circling and torticollis occurred in only three lambs (figure 5).

Laboratory Procedures

At necropsy, sterile micropipettes were used to remove a sample from the medulla of the brains of four ewes and three lambs. These were cultured in dextrose broth. Five cultures yielded organisms resembling *Listeria monocytogenes*. On three occasions, a drop of the cultured organism was placed in the eye of healthy rabbits, resulting in a severe reaction (figure 6). Clinical signs, cultural characteristics, morphology, histopathology, and the eye-reaction were considered sufficient to establish the identity of the organism.

Histopathological studies were made on the brains of four ewes and four lambs. The most prominent microscopic lesion was perivascular cuffing (figure 7) observed in the medulla and midbrain, due chiefly to lymphocytic infiltration. A few neutrophils were also present. In three cases, the medulla and midbrain were also diffusely infiltrated with neutrophils (figure 8).

Large accumulations of neutrophils with accompanying foci of necrosis were seen in several sections of the medulla and pons (figure 9). Areas of necrosis and large numbers of gitter cells with a few lymphocytes and neutrophils (figure 10) were seen in sections of the medulla and pons from three different animals. Very small microscopic foci of neutrophils (figure 11) were seen in the cerebellum of two affected sheep. More extensive necrosis and greater macrophage infiltration were found in these brain sections than had been reported by other authors.

Discussion

This outbreak involved both mature ewes and young lambs. The eight ewes ranged in age from two to seven years, with an average of five years. The eleven lambs averaged 57 days of age with a range of 34 to 82 days. The ages of the three surviving lambs when afflicted were 47, 52 and 57 days. The sex was evenly divided into six males and five females. Four breeds (Columbia, Merino, Shropshire, Targhee) and their crosses were represented in the flock. Only the Shropshires escaped infection; however, they made up only a small portion of the flock.

None of the affected ewes were pregnant. Three had failed to conceive and five had already delivered lambs, one seven days previously and the other four 70 to 81 days prior to contracting the disease. Three had had twins, but one of each pair had succumbed for various reasons. No lambs from any of these ewes developed listeriosis, although all lambs continued to nurse even when the ewe was near death.

The first case (January 11) occurred in a ewe before any lambs were born. The outbreak reached a peak three months later (April — 16 cases) after nearly all the ewes had lambed. No abortions were observed. The incidence of infection was 2.6% in the ewe flock and 3.0% in the lamb crop. Three of eleven lambs, found in early stages of the disease, survived; they were treated with large doses of long-acting penicillin (three million units) repeated in 48 hours. Other animals succumbed, although some were treated with penicillin intramuscularly. Four cases received chlortetracycline intravenously and streptomycin intramuscularly, but failed to respond. Two lambs and two ewes, found in advanced stages, with subnormal temperatures, were not treated.

The course of the disease from first signs until death ranged generally from less than 24 hours to five days; one lamb died nine days after first discovery. Three ewes and two lambs died within a few hours after being noticed. In these, the disease followed a very rapid course, the animals usually being comatose when first found, even though regular and numerous observations

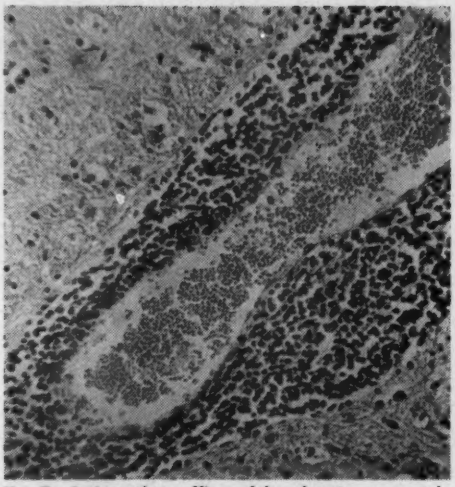
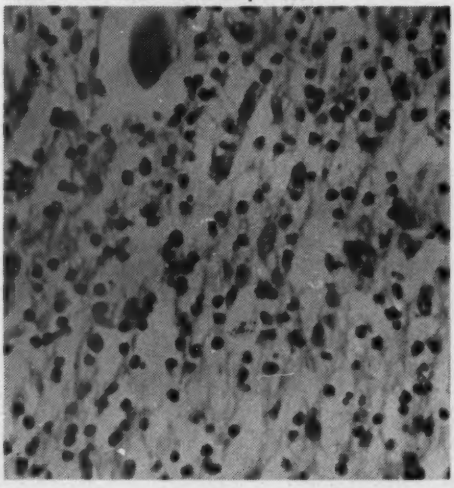


Fig. 7. Perivascular cuffing of lymphocytes present in medulla and midbrain. H & E, x 125.

Fig. 8. Diffuse infiltration of neutrophils present in medulla and midbrain. H & E, x 500.



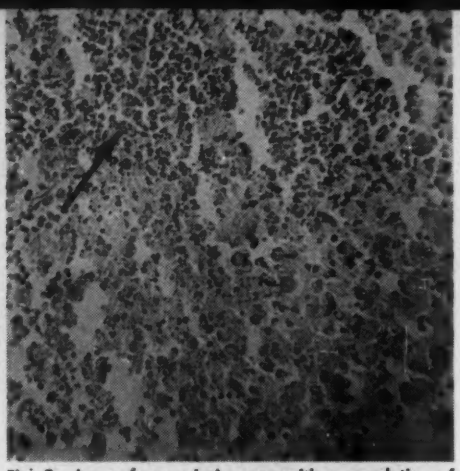
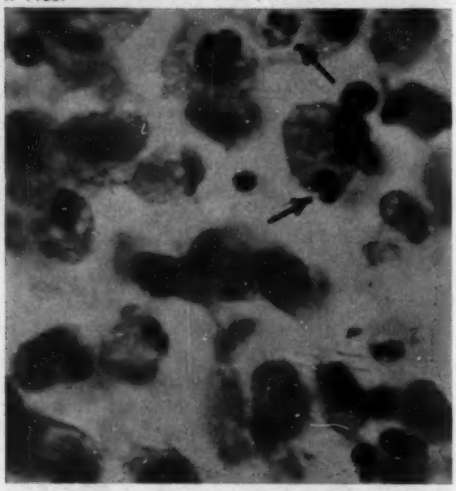


Fig. 9. Area of necrosis in pons with accumulation of neutrophils (arrow). H & E, x 215.

Fig. 10. Area of necrosis with large numbers of gitter cells. Some contain engulfed particles (arrows). H & E, x 1185.



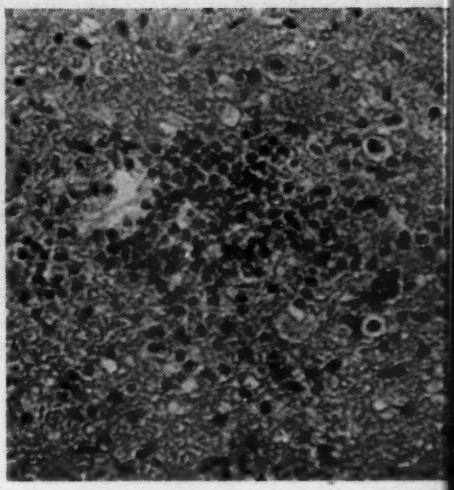


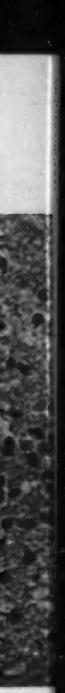
Fig. 11. Foci of neutrophils in cerebellum. H & E x 500.

of the flock were made. Rectal temperature on initial examination ranged from 104 F to 108 F., with an average of 105 F.

Culture of the organism from the medulla was successful in five of seven attempts even though four of these had received penicillin 24 hours prior to death. Of the two attempts at isolation which failed, one was grossly contaminated and the other sample was from a ewe which had received six million units of penicillin intramuscularly 12 hours previous to the isolation attempt.

Summary

Listeriosis occurred in 19 sheep (2.8%) in an Ohio flock with a previous history of the disease. Symptoms were variable in the ewe flock, but followed a consistent pattern in the lamb crop. *Listeria monocytogenes* was isolated from the medulla of five affected animals. The histopathology, treatment, course of the disease and results are briefly discussed.



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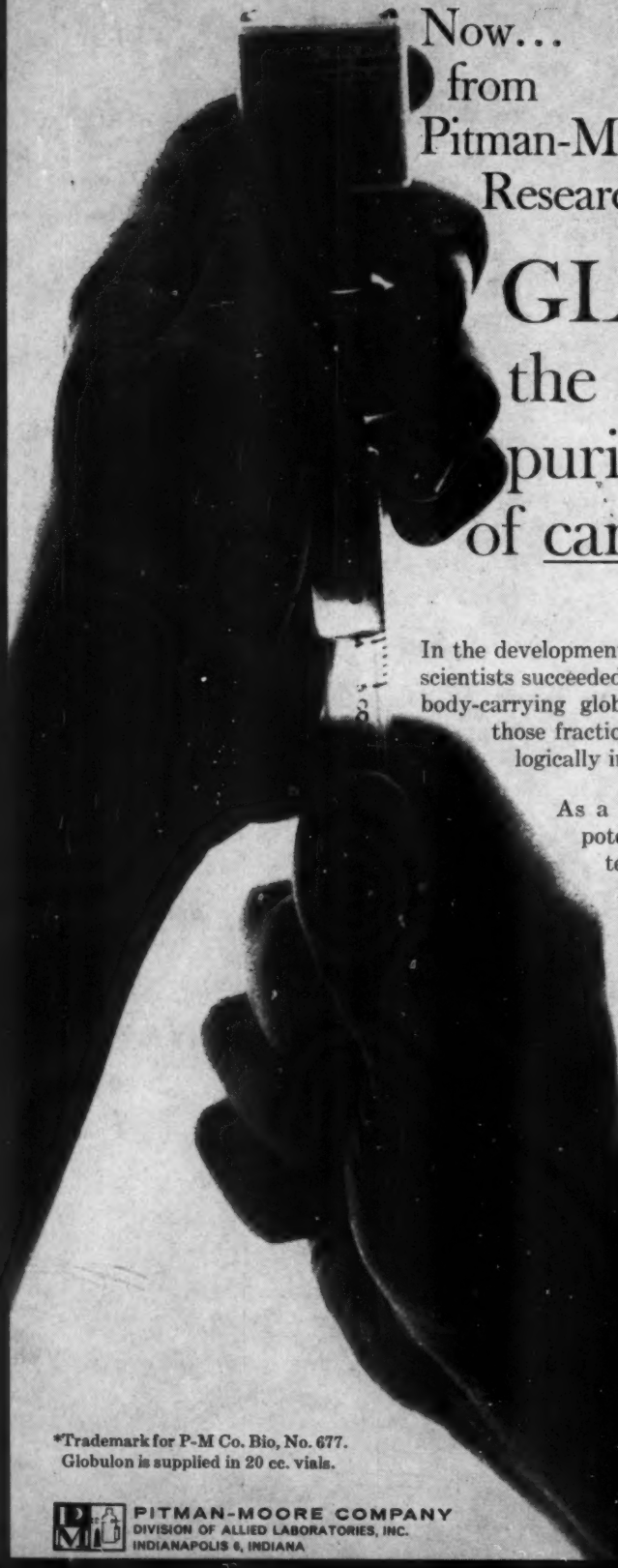

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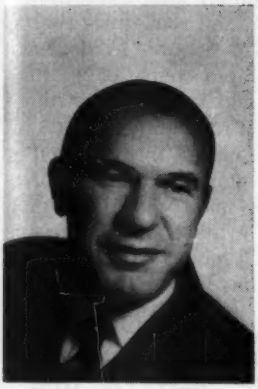

Systemic and subcutaneous mycoses are being reported with increasing frequency and appear to be more common than was previously supposed. The manifestations of these chronic diseases in animals are reviewed for the practitioner.

Mycotic Diseases of Animals

W. J. ZONTINE, D.V.M.

Lancaster, California

DISTEMPER is considered to be a disease confined to animals the same as scarlet fever affects only man. Between these extremes is a group of diseases common to both, namely the fungous diseases. The similarity of the pathogenic process observed in both species is so striking that it provides the physician and veterinarian a truly common meeting ground.

Veterinary mycology is a relatively new field of investigation. External lesions exhibited by the dermatophytes have been recognized clinically for many years. Until recently, however, systemic mycoses had been classified as rare diseases. Increased reports of this type of fungus infection indicate that the entity is more common than it was previously thought to be. Several reasons for the increased number of reported cases of systemic mycoses are at once apparent:

1. The art of diagnosis in veterinary medicine is becoming more refined. Increased use of laboratory aids by the veterinarian and the work of public health agencies in positive identification of the etiological agents have been of assistance in this respect.

2. The increase in the dog population, estimated to be between 20 and 25 million in the United States, is another factor. With a sizable section of the human population traveling all over the country with their pets, many animals are exposed to strange infections to which they have no resistance. In turn they proceed to carry those infections back to their native areas to produce another potentially infected region.

3. We cannot underestimate the influence of the widespread indiscriminate use of antibiotics, which is successfully controlling the common bacterial infections while allowing resistant viruses and fungi to increase.

The apparent increasing frequency of

Presented at the 26th annual meeting of the A.A.H.A., Colorado Springs, May 6-9, 1959.

mycotic diseases in animals makes it necessary for the veterinarian to be aware of their clinical appearance. Following is a review of some of the more common fungal infections.

Mycotic diseases of animals are classified into three general groups:[18] (1) systemic, (2) subcutaneous, and (3) cutaneous. From a public health viewpoint, the cutaneous group of animal mycoses is the most important. It is estimated that 10 to 30% of the cases of ringworm in man in urban areas, and 70 to 80% in rural areas, are contracted directly or indirectly from animals.[13]

This discussion will be confined to the systemic and subcutaneous types of mycotic infections.

The Systemic Mycoses

Even though there is no direct evidence that the systemic and subcutaneous mycoses are spread from animals to man, there is probably a common source of infection and a potential for contagion. Since most of these diseases are spread on the ground, the proximity of animals to this source of contamination makes them a vulnerable target for infection.

The three major systemic mycoses are blastomycosis, histoplasmosis, and coccidioidomycosis. Blastomycosis is most endemic in the eastern United States; histoplasmosis in the central states and coccidioidomycosis in the arid southwest.

Blastomycosis. This is specifically North American blastomycosis, or "Gilchrist's disease," to distinguish it from "European blastomycosis," which is cryptococcosis. The causative agent, *Blastomyces dermatitidis,* is a round, budding, yeastlike fungus found most frequently in the eastern and central United States, but appears to be fairly well scattered all over the North American continent. Presumably, the infection originates from an exogenous source entering *via* the respiratory tract, although the organism has never been found free in nature. It has not been found in the soil as most of the other fungi have, and has not been found in wild animals.[6]

The disease is chronic in dogs and horses and is characterized primarily by pulmonary symptoms, debility, subcutaneous abscesses, ulcers, bone and sometimes central nervous system involvement.[1] In dogs the disease assumes a rapid course of approximately one month and is found most often in the Boxer.[22] Chest radiographs are useful in diagnosis. Dense masses in the region of the heart due to granulomatous involvement of the lungs and bronchial lymph nodes[1] are usually evident. A skin test is available using the product "blastomycin." However, this test has limitations in that a cross-reaction often occurs between blastomycosis and histoplasmosis. Debilitated animals often lose their skin sensitivity and many normal animals react. One writer[10] contends that it is best to skin test with both blastomycin and histoplasmin at the same time, the agent showing the greater reaction being the probable sensitizing one. As in the case of most systemic mycoses, positive diagnosis is established only by cultural methods, or by demonstration of the organism on histological section. Complement-fixation tests give a presumptive diagnosis.

Histoplasmosis. This is the most frequent systemic mycosis found in dogs in the central United States[26,29,37] with an incidence of three to four per thousand in the endemic areas.[10] Cats, cattle, horses, and wild animals are occasionally infected,[9,28] but dogs and man remain the primary victims. The infection is so prevalent in man that it was estimated in 1955 that 30,000,000 persons in the United States were infected and that perhaps 500,000 new infections developed each year.[31] Endemic areas are described as the Ohio Valley, the Central Mississippi Valley and along the Appalachian Mountains, though occasional foci of infection are found in areas distant from this region.[14,6]

The causative organism, *Histoplasma capsulatum,* is intracellular in nature and is primarily a parasite of the reticulo-endothelial system. It grows in soil with a high organic content, particularly in moist, shady areas, such as chicken coops, pigeon roosts, caves, silos and cellars. Infection occurs by inhalation of the fungus.

The symptoms observed in dogs are cough, intractable diarrhea, emaciation, mesenteric and mediastinal lymphadenopathy, elevated temperature, often ascites, and 100% mor-

tality in acutely ill dogs.[7] Though workers have been unable to demonstrate the transmissibility of the infection from known infected dogs to people in the same household, there is evidence that it does transmit to puppies in the same litter[37] and to dogs in adjacent cages.[7,8] This would appear likely as the organisms can be found in nearly every body secretion of infected animals. For this reason it might be of public health importance.[38]

As in blastomycosis, diagnosis is established by finding the organism in secretions, by culture, histological sections, and by serological methods. Skin testing has limitations.

Coccidioidomycosis. This disease, known also as "coccidioidal granuloma," "valley fever" or "San Joaquin fever," is the most common systemic mycosis encountered in the western United States and is probably the most infectious of the group. The endemic area is that classified bio'ogically as the Lower Sonoran Life Zone which encompasses the arid southwestern United States and northern Mexico. This region is characterized by hot summers, few winter freezes, low altitudes, and an alkaline soil required for propagation of the fungus.[22] The fungus, *Coccidioides immitis,* propagates in the soil and is inhaled on dust particles. It can also enter the body through contaminated wounds, but the respiratory route is the primary pathway.

The disease is widespread in animals. It has been found in dogs, cattle, sheep, a gorilla, swine, a horse,[39] a monkey and a chinchilla.[28] In cattle and sheep, the disease is benign and involves mainly the bronchial lymph nodes.[19] In horses it assumes a generalized, granulomatous, debilitating course. In dogs the condition is primarily a respiratory infection with subsequent dissemination to bones, other organs, and sometimes the central nervous system. It is characterized by persistent cough, erratic fever, debility, lameness, partial anorexia, difficulty in swallowing,[20] vomiting and distress or collapse after eating, and occasionally epileptiform convulsions. Granulomas are found prominently in the lungs and bronchial lymph nodes and can be seen radiologically invading the chest and bones.

In the endemic areas diagnosis can often

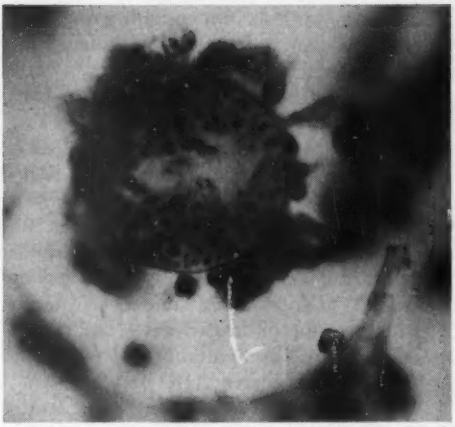

Photo courtesy Keith T. Maddy, D.V.M., M.P.H.

Sporangium of *Coccidioides immitis* x 970.

Photo courtesy Keith T. Maddy, D.V.M., M.P.H.

Dog with disseminated coccidioidomycosis. Note the enlarged left carpus.

Dog with disseminated coccidioidomycosis. Note the cachexia and lameness.

Photo courtesy Keith T. Maddy, D.V.M., M.P.H.

be made on the basis of a coughing dog with a persistent temperature which fails to respond to the wide-range antibiotics.[20] The organism can be found in exudates and biopsies and detected serologically. The skin testing agent, coccidioidin, is used quite extensively in man as an aid to diagnosis. This product is available in both the 1:100 and 1:10 dilutions. However, its use in dogs in either dilution has been quite disappointing and is generally regarded as useless. The only dependable coccidioidin in animals is the undiluted material[21] which is not commercially available and would be prohibitively expensive if it were.

This organism is quite easy to culture. However, this should be attempted only by qualified technicians with proper equipment since the cottony mycelial growth is extremely infective. In general this precaution holds true for any of the systemic mycoses, as culture should not be attempted by persons not trained or properly equipped for the procedure.

Actinomycosis. This is primarily a disease of cattle but has been reported in dogs,[27] swine,[15] and horses.[23] In cattle the disease is of economic importance, causing millions of dollars loss annually as measured by condemnations at slaughter houses. The bovine type of actinomycosis is commonly referred to as "lumpy jaw," since the organism most often invades the bony tissue of the head, particularly the mandible. Less often it is found in other tissues in the body. Many cases of actinobacillosis in cattle are mistakenly called actinomycosis. The bacillary disease, however, is usually confined only to the soft tissues whereas the mycotic disease is most often located in bony structure.

The organism, *Actinomyces bovis,* is a normal inhabitant of the mouth of cattle and swine and probably enters the tissue via traumatic lesions.[12] In the case of actinomycotic mastitis of swine the sharp teeth of suckling piglets is the most likely source of entry. In California cattle, foxtail grass is the major traumatic offender.

Animals may serve to disseminate the disease by distributing it through saliva and feces.[16] Milk and meat from affected animals is not infective. At one time it was believed that man contracted actinomycosis by trauma from infected grass, hay, etc. Investigation has shown, however, that the organism *A. bovis* is a common inhabitant of the human mouth also, so it needs no introduction from the outside.[8,17]

Nocardiosis. This fungus disease affects dogs and poultry and is caused by the organism, *Nocardia asteroides.* The condition is often confused with actinomycosis.[4] In dogs the disease nearly always exhibits a pleuritis, pleural and mediastinal effusion, markedly enlarged bronchial lymphatics,[9] prominent emaciation and sometimes subcutaneous swellings and bloody diarrhea.[24] Chest films usually show a definite fluid level in the chest. The aspirated exudate is characteristic, being a reddish, creamy fluid. Heavy elements precipitate in a few hours, leaving a clear liquid above, a reddish band and a creamy, clumpy material at the bottom of the tube. At autopsy the pleura is found to be characteristically thickened and reddened with a velvety appearance. The bronchial lymph nodes are usually affected. The disease is almost always fatal. Recently there have been reports of successful treatment in dogs utilizing antibiotics, thoracocentesis and a thoracotomy to remove the affected pleura.[6]

Aspergillosis. Organisms of the Aspergillus spp. have been isolated from the placenta of cows that had aborted.[18] Aspergillosis is a disease among poultry causing widespread losses from a fatal respiratory infection. Mouldy feed and litter have been incriminated as the source of contamination.[8] This condition differs from the other deep-seated mycoses in that it does not cause a chronic condition. Aspergillosis is the most common disease of penguins in captivity.[28]

Mucormycosis. Fungi of the Mucor type have been reported as the probable pathogens in cattle and swine exhibiting abortion and in dogs showing convulsions, granulomas in the kidneys and bloody diarrhea.[7] It has also been found in cattle as a pulmonary granuloma and in horses as the causative agent of a tumor in the region of the withers and a soft tissue mass in the maxillary sinus.[25]

Cryptococcosis. The last systemic fungal

disease that logically becomes a part of this discussion is Cryptococcosis. For many years the equine disease, "epizootic lymphangitis," has been attributed to the organism *Cryptococcus farciminosus*. This disease is characterized by chronic, nodular, suppurative lesions of the skin following lymphatic channels. Recent work,[26] however, seems to indicate that the disease is actually of the histoplasmosis variety. Cryptococcosis in dogs, cattle, and cats is caused by the organism, *C. neoformans*, and is observed as a respiratory disease with otitis media, purulent sinusitis, and central nervous symptoms.[24,25] This fungus has also been isolated in bovine mastitis.[19] Even though it is destroyed by pasteurization,[3] a potential public health hazard exists both from infected milk and the possible transmission from infected dogs and cats living in such close contact with man.[24] However, this has not been actually demonstrated.

The Subcutaneous Mycoses

This is an indefinite, loose grouping of several diseases in which the main lesions are seen affecting the subcutaneous tissues. Although internal invasion occurs in many of these conditions, the primary site is in the external tissue. This is the basis on which a special classification is proposed.

Chromomycosis. Infections attributed to this class of fungus have been reported in dogs and horses and are observed as ulcerating nodules of the feet, legs, and regional lymphatics. In dogs the nodules involve the foot and discharge a black exudate.[28]

Mycetoma. This condition is similar to chromomycosis and has been reported in dogs as a tumor-like lesion on the bottom of the foot caused by a brown-pigmented fungus similar to *Allescheria boydii*.[28] Another report indicates Aspergillus species as the causative agent.[21]

Moniliasis. The common fungus, *Candida albicans*, occurs as a saprophyte on the mucous membrane and has been involved as the pathogen in lesions of the mouth, crop, and esophagus in chickens and parakeets. Symptoms are not particularly characteristic. Thickening of the mucosa of the crop and the formation of whitish, circular ulcers as the primary lesions form the symptoms.[5] Losses can be quite severe in young birds. Although birds seem to be most affected, the condition has been seen in dogs, calves and colts.[28]

Sporotrichosis. Of the many species of Sporotrichum which have been reported, only one, *S. schencki*, is of importance in animals.[15] The disease has been observed in horses, mules, dogs, cats, and rats, and is characterized by nodules and ulcers in the skin.[28] Horses exhibit spherical nodules which have no tendency to coalesce or to follow lymphatic channels. The nodules ulcerate discharging a yellowish pus. The fungus enters the skin *via* puncture wounds, as from thorns, splinters, or bites, and in this manner might be of public health importance in that animals might act as carriers (perhaps passively) of the disease to man through infected bite wounds.

Summary

In summing up the systemic and subcutaneous mycoses of animals, it can be stated that in general the diseases produced are usually chronic, debilitating, disseminated infections exhibiting granulomas and symptoms of respiratory disease, intractable diarrhea, bone involvement, sometimes central nervous system symptoms and are usually highly fatal. The transmission from animals to man might possibly occur though this appears to be rather remote. It is well for veterinarians to be aware of the existence of these diseases and know something of their general symptoms since they are being reported with increasing frequency and appear to be more common than was previously supposed.

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Pregnancy Determination

Pregnancy determination is an increasingly frequent type of examination that pony owners are demanding. Many practitioners shy away from this, but I suggest that they are doing so unnecessarily. Everything is usually in the examiner's favor. Most frequently these requests for pony mare examinations, unlike examinations of thoroughbred mares, are made relatively late in the gestation period.

The pony mare is smaller and usually less fractious. An open doorway, a low board fence with a gateway, or the corner of a building is all the equipment needed to protect the examiner. The biggest obstacle is the small size of the anal sphincter of some mares. If it will not accomodate the arm of the examiner, one must resort to one of the biological tests.

Some recent work done by Dr. Leroy Taul and Dr. G. W. Thornton at the University of Georgia, School of Veterinary Medicine, has shown promise in this field. They were able, with a high degree of accuracy, to diagnose pregnancy of 45 to 120 days' duration by injecting 5 cc. of pregnant mare serum into the male (Rana pipen) frog. A positive test is indicated by the production of spermatozoa in the male frog's urine after one hour.—*Paul E. Hoffman, D.V.M., Georgia Veterinarian, January - February 1959.*

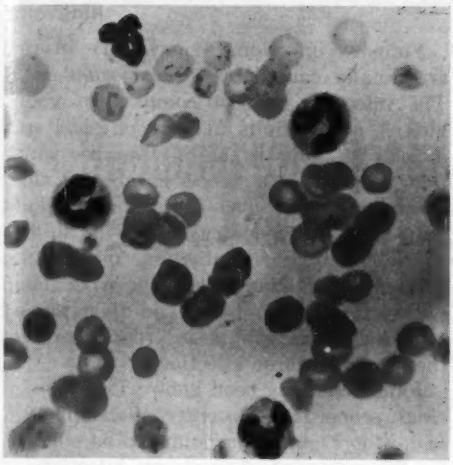

FIGURE 4

III-Anemia

CAT PRACTICE

C. E. DeCAMP, D.V.M.

Scarsdale, New York

CATS perhaps suffer more often and more severely from anemia than any other species.[13] Regardless of cause, the symptoms commonly reported by the owner are similar and nonspecific. They include lethargy, weakness, inappetence, and occasionally vomiting. In advanced cases restlessness and dyspnea may develop as result of anoxia. Heart murmurs and increase of vesicular sounds in the lungs also may occur. The cat with dyspnea from anemia is pale and usually lies on its side, while a cat with dyspnea resulting from abnormal fluids or masses in the chest will be cyanotic, and will lie on its sternum.

Anemia may be of any of the three broad physiologic types and has many causes. Anemia from acute blood loss is the least common in cats; hemolytic anemia, and anemia caused by decreased red cell production from infection are both seen commonly. Both may usually be treated effectively by blood transfusions and the rational use of antibiotics. They must be differentiated from lead poisoning, bacteremia, and toxoplasmosis.

An infectious type of anemia caused by *Hemobartonella felis* is common, and adult cats often are carriers of this disease.[14] The history generally discloses inappetence and weakness. Splenic enlargement and mild jaundice are common. The blood picture with Giemsa stain is characteristic when minute dark bodies of varied shapes are found on the surface or periphery of the red cells, (Figure 4). The slide should be rinsed thoroughly to remove stain precipitate. Since the characteristic bodies are not present at all stages of the infection, repeated studies may need to be made.[15] Leukocytosis with an increase in monocytes and blood platelets is seen commonly.

Whole blood transfusions or normal feline serum in daily doses often will give adequate support until the patient recovers completely. Response is often remarkable. Patients with a hemoglobin level of 4 gm. (normal 13 gm.) may respond satisfactorily to transfusions of 40 to 80 cc. of whole blood. Since the temperature usually is subnormal, moderate warmth supplied by heat lamp or blanket may be needed. Large doses of tetracycline are beneficial.

Toxoplasmosis

Toxoplasmosis apparently is more common in animals than has been realized though diagnosis is usually by postmorten examination.[16,17] Both young and adult cats may be affected, with persistent high fever (104 F.), pneumonia, rapid breathing of progressively greater severity, moist rales, anorexia, and dehydration. It does not respond to antibiotic therapy. Antemorten diagnosis is difficult and largely impractical, but if an early diagnosis is made a combination of pyrimethamine (Daraprim—Burroughs Wellcome) and sulfonamides appears to be helpful in treatment. On postmortem examination necrotic areas may be found in one or more of the glandular organs and brain. Histologically these may contain typical toxoplasma bodies. The causative organisms may be identified in exudates in the body cavities of experimentally infected mice, and thus provide diagnostic evidence.

Ringworm

Fungous infections (ringworm) in cats are usually caused by *Microsporum canis.* The infection is most common in young kittens, or in adults in poor physical condition. *M. canis* is the only species which fluoresces under a Wood lamp, and since other fungi may also cause these lesions, hairs from infected areas should be studied by microscopic examination or cultural methods when examination by Wood lamp is negative. It is important to diagnose and treat early, mild stages, in order to prevent the spread of these infections.

Iodine has long been known for its fungicidal properties. Recently W 'adol (Pitman-Moore) has been found to be effective for the treatment of ringworm infections in cats. It is available both as liquid shampoo, and in ointment form. It is a nontoxic iodine which provides the desirable therapeutic action of iodine, without causing irritation, staining, or other undesirable effects.

Practitioner Problems in Feeding the Parakeet

IN OUR PRACTICE we think of unusual pets as any house pet other than dogs and cats. One of my most irritating problems in life are people who buy unusual pets without some preliminary study of the pet and associated problems, and the dealer who will not present both advantages and disadvantages to owning such a pet. Many of the dietary problems we see are usually irreversible by the time they are presented at the clinic. Clients usually profess ignorance of how to properly feed an unusual pet, and sometimes say that their veterinarian did not know how to advise them.

In the last six years, the number of parakeets being maintained as pets has increased dramatically. The shell parakeet or budgerigar is also commonly called the Australian undulating grass or grass shell parakeet. Lovebird is a misnomer because it is of an entirely different group of psittacine birds. The budgie is primarily a seed eater and most of the commercial parakeet seed sold is suitable. Generally, packaged seed contains millet seed, canary seed, and hulled oats. Some authorities claim that in addition the parakeet can be offered anything eaten by human beings with the exception of condiments. They enjoy greens, fruits, vegetables — and some bits of raw meat can be fed also. Minerals should be furnished with cuttlebone or oyster shells ground. Gravel such as coarse, clean, sharp sand is needed to help grind the seeds. I believe some vitamin-mineral mixture like VPC, Pervinal, or Vionate can be mixed with the seed at regular intervals. Fresh water should be available at all times. We see approximately three to five parakeets a day at Berwyn Animal Clinic and believe most practitioners can do the same if they are willing to take an interest in this bird.

Hemobartonellosis in the Dog

E. F. DONOVAN, D.V.M., W. F. LOEB, V.M.D., M. Sc.

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Hemobartonella canis has long been recognized by researchers as a causative agent of sporadic hemolytic anemia in the dog. But to make veterinary practitioners aware of the clinical and biological characteristics of hemobartonellosis, six new cases are reported here.

The first case was diagnosed at the Ohio State University Veterinary Clinic. Blood from this dog was used to produce the disease by serial injections in four other dogs so that characteristics of the disease could be studied.

Review of Literature

Hemobartonellosis in the dog was first described by Kikuth[1] in Germany in 1928. The first reports of *Hemobartonella canis* in this country were published by McNaught, Woods, and Scott,[2] and by Knutti and Hawkins,[3] both in 1935. Ingle,[4] in 1946, reported on a case of sporadic anemia in a dog and noted that the erythrocytes contained inclusions resembling *Hemobartonella muris*. Griesemer,[5] in his review of bartonellosis, mentioned a dozen or so cases that had been recorded in the dog prior to 1958, and indicated that the organism isolated from the dog had been transmitted to the cat. He stated that the species identification was based on the host, and that species differences were poorly defined.

Lumb,[6] in 1958, reported a clinical case of hemobartonellosis in a splenectomized dog and was successful in transmitting the disease to other splenectomized dogs. He indicated that in non-splenectomized dogs the spleen protects the animal, and keeps the infection latent; however, activation may occur following removal of the spleen.

Report of Clinical Case

On December 9, 1958, a four year old female Cocker Spaniel was presented to the veterinary clinic at the Ohio State University. The dog had been treated for a bacterial infection and an anemia of unknown etiology for several weeks. The animal's condition had deteriorated gradually, and was considered serious for about four days prior to presentation. The owner reported that the dog had a poor appetite, drank lots of water, and that the urine had an orange color and a strong odor. The dog had been immunized against distemper and hepatitis, and had last been in heat in May 1958.

Physical examination revealed a slightly underweight, very depressed animal which appeared surprisingly responsive to its surroundings for its poor general condition. The oral mucous membranes and the conjunctiva were very pale. Palpation revealed slight enlargement of the mandibular and popliteal lymph nodes. No abnormality or pain was evidenced by deep abdominal palpation. Temperature and respirations were normal, and the pulse rate was 144. No other signs of illness were revealed by physical examination.

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Presented at the 26th annual meeting of the A.A.H.A., Colorado Springs, May 6-9, 1959.

The hemogram on the day of admission is shown below.

	Hb.	Hct.	RBC	WBC
Dec. 9, 1958	4.6	13	1.2	20,250
	Segs.	Non Segs.	Lym.	Eos.
Dec. 9, 1958	60	23	11	3
Morphology: 52 nucleated RBC per 100 white cells, anisocytosis, polychromatophilia, round basophilic bodies in RBC's.				

Abnormal urinary findings included a brown color, turbid appearance, 100 mg. of albumin per 100 ml., and a strongly positive reaction for bilirubin. The blood urea nitrogen was 17.4 mg. per 100 ml. Fecal flotation for parasitic ova, and serologic tests for leptospirosis were negative.

Initial treatment consisted of 250 ml. of whole blood, 600,000 units of crystalline penicillin, 600,000 units of procaine penicillin, and 0.5 gm. dihydrostreptomycin. Blood transfusions were continued for the next two days at the rate of 150 ml. per day, and penicillin and dihydrostreptomycin were continued twice daily for seven days.

On the fourth day, the animal began to show slight improvement. The appetite was fair, the color of the oral mucous membranes and conjunctiva was improved, and the hemogram had changed as follows:

	Hb.	Hct.	RBC	WBC
Dec. 12, 1958	7.95	24	1.9	12,900
	Segs.	Non Segs.	Lym.	Eos.
Dec. 12, 1958	48	12	27	—
Morphology: 13 nucleated RBC per 100 white cells, anisocytosis, polychromatophilia.				

On this date, leptospiral serology and urinalysis were repeated with findings similar to the initial examination.

On the seventh day, the animal appeared greatly improved. She was active and alert, her oral mucous membranes and conjunctiva were pink in color, and her appetite was normal. The hemogram had further progressed toward normal, as indicated here:

	Hb.	Hct.	RBC	WBC
Dec. 16, 1958	10.6	34	3.4	5,450
	Segs.	Non Segs.	Lym.	Eos.
Dec. 16, 1958	84	3	12	1
Morphology: 15 nucleated RBC per 100 white cells, anisocytosis, polychromatophilia, no basophilic bodies in RBC's.				

Although no specific cause for the hemolytic anemia had been determined, hemobartonellosis was suspected according to the finding of basophilic bodies in the erythrocytes. After 25 ml. of blood was withdrawn for injection into a splenectomized dog, the patient was given 600,000 units of Bicillin (Wyeth Laboratories) fortified, and discharged to the owner.

The dog was returned March 5, 1959, at which time physical examination revealed a normal, healthy dog. The hemogram at this time follows:

	Hb.	Hct.	RBC	WBC
Mar. 5, 1959	16.5	44	6.4	8,200
	Segs.	Non Segs.	Lym.	Eos.
Mar. 5, 1959	38	4	33	25
Morphology: No cellular abnormalities. Basophilic bodies present in RBC's.				

Hemobartonellae were still seen in the erythrocytes, although no other abnormality or evidence of disease was present. As late as July 1, 1959, the dog continued in good health.

Investigation Methods

This investigation consisted of clinical and laboratory observations on six dogs, splenectomized and non-splenectomized. The dogs were inoculated with blood from the naturally occurring case described

TABLE 1

Dog No. 1	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
12-17-58	14.6	40	6.12	25,100	87	5	6	1	
1-9-59	4.85	14.2	—	4,950	67	5	26		Hemobartonella positive, 2 nucleated RBC's/100 leukocytes, polychromatophilia, poikilocytosis, hypochromia.
1-20-59	4.85	13	—	7,550	69	1	30		6 nucleated RBC's. Hemobartonella positive.
1-28-59	7.95	25	—	10,150	57	2	41		14 nucleated RBC's, polychromatophilia. Hemobartonella positive
2-11-59	8.8	15	1.70	7,550	72		28		14 nucleated RBC's, polychromatophilia, anisocytosis

TABLE 2

Dog No. 2	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
1-15-59	16.5	43		20,700	79	1	17	3	
1-27-59	13.4	39		11,500	43	7	40	10	Hemobartonella positive
2-2-59	11.2	28		12,850	57	3	36	4	7 nucleated RBC's.
2-7-59	5.4	20	2.06	18,800	28	5	64	3	Hemobartonella positive. 118 nucleated RBC's/100 WBC's. Polychromatophilia, anisocytosis, poikilocytosis
3-30-59	10.6	32		8,300	59		33	8	Hemobartonella positive. 2 nucleated RBC's/100 WBC's
4-10-59	7.65	24		7,150	38	4	50	1	166 nucleated RBC's/100 WBC's
6-30-59	11.25	30		15,150	70	1	23	4	1 nucleated RBC/100 WBC. Polychromatophilia, Hemobartonella positive

TABLE 3

Dog No. 3	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
1-15-59	11.9	34		14,800	71	1	19	9	Basophilic coccoid bodies
2-2-59	10.9	30		13,150	52	2	45	1	Basophilic coccoid bodies
2-2-59	11.6	38		15,650	32		64	4	Basophilic coccoid bodies
3-16-59	4.05	14		12,900	32	8	57	3	Hemobartonella positive 12 nucleated RBC's/100 WBC's, poikilocytosis
4-10-59	8.45	26		12,000	43	10	41	6	Anisocytosis

above, or serially from one another, so that only blood from dogs showing active infection was used.

The dogs were examined daily, noting especially the temperature, clinical evidence of anemia, appetite, and general activity. Hemograms were determined whenever a change in the clinical conditions appeared to warrant it.

Results

Dog no. 1 was a seven month old female Boston Terrier that was infected with *Strongyloides stercoralis*, and had been under treatment for two months. She was in apparent good health except that her stools were semi-solid. The dog was splenectomized on December 16, 1958, and was inoculated the following day with 25 ml. of whole citrated blood from the clinical patient described above. Her hemogram is shown in table 1.

The attending interne recorded the first change in the dog's clinical condition January 7, 1959. The animal was slightly depressed, and her mucous membranes were pale. On January 9, her hemogram was determined, as indicated in table 1.

Because of the severe anemia, the dog's condition was considered grave and whole blood transfusions were given at the rate of 4 ml. per pound of body weight. Also, 1.5 ml. of Zymatinic Drops (Upjohn) were given daily. Hemograms were repeated on January 20 and 28, and on February 11, (table 1.) A total of seven transfusions were given without typing or cross-matching. The dog died of transfusion reaction on February 10. During the course of the study, the dog showed no evidence of illness, except depression and palor.

Dog no. 2, an eight month old male black and white Terrier cross, was splenectomized on January 14, 1959, and was transfused with 10 ml. of citrated whole blood from dog no. 1 on January 19, 21, and 23. On the 13th day following the last transfusion, the animal was listless and depressed, his mucous membranes were pale, his appetite was poor, and his temperature was elevated approximately one degree. Signs other than depression and palor had regressed completely by February 10. During the next three months, the dog received three transfusions at the rate of 4 ml. per pound of body weight. On April 6, the animal was treated with 43 mg. of Mepharsen (Parke-Davis) intravenously. The animal vomited 15 minutes after the injection. At the time of this writing, the dog remains under observation, in good health. Hemograms determined throughout the study are shown in table 2.

Dogs no. 3 and 4 were littermate, two month old male Cocker Spaniels that were presented to the clinic because of congenital cataracts. These animals were otherwise healthy puppies and were splenectomized on January 16, 1959. At the time of splenectomy, hematologic examination revealed dark, round basophilic bodies in the erythrocytes, indistinguishable from the coccoid form of hemobartonella. Careful clinical and laboratory examination failed to reveal any evidence of illness during a seven-week period following splenectomy. On March 2, puppy no. 3 was inoculated with 15 ml. of whole citrated blood, intravenously from dog no. 2. On the 13th day, he showed mild depression and extremely pale mucous membranes. On May 6, the animal was treated with 30 mg. of Mepharsen intravenously, and vomited shortly after the injection. Accidental death from unrelated conditions occurred on May 16. Necropsy revealed no significant deviation from normal. Hemograms during the study are shown in table 3.

TABLE 4

Dog No. 4	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
1-15-59	11.25	31		15,700	42		40	18	
2-11-59	11.25	32	5.1	17,500	33	1	59	7	Basophilic coccoid bodies
3-2-59	12.25	35		16,250	48		47	5	Basophilic coccoid bodies
4-10-59	11.5	32		12,800	61		32	7	Basophilic coccoid bodies

Dog no. 4 was held as an uninoculated splenectomized control, and showed no evidence of illness on clinical or laboratory examination. This dog's hemogram is shown in table 4.

Dog no. 5 was a two month old female Terrier that was purchased for this experiment on February 16, 1959. At that time, the dog was infected with coccidia, which was controlled by treatment. On March 2, the hemogram (table 5) showed no abnormalities, and the puppy was splenectomized on that date. Because of the possibility that this animal might have been harboring latent infection which could have been activated by splenectomy, the puppy was kept under observation for one month. Clinical and laboratory evidence showed no changes during that time. The animal was inoculated on April 3 and 6 with 25 ml. of citrated whole blood from dog no. 2. On April 17, the animal showed a temperature rise of one degree, she was slightly depressed, and she showed mild clinical signs of anemia. The animal maintained the elevated temperature for eight days, and by April 25, a severe anemia was present. The dog's condition was never considered critical, however, and no treatment was given at any time. The dog is still in good health at the time of this writing. Her hemograms are shown in table 5.

Dog no. 6, a two month old male Terrier, was observed from April 1 to April 26, 1959, and remained active and healthy. The dog was inoculated with 10 ml. of blood from dog no. 5 on April 25 and 26. This animal was a non-splenectomized control used to determine the effect of the spleen in preventing active hemobartonellosis in a healthy dog. The animal was observed until May 15, at which time a hemogram was done to determine the presence of hemobartonellosis. The results are indicated in table 6. The animal was held under observation until June 11, with no evidence of disease. He was then turned over to another project.

Discussion

The finding of coccoid basophilic bodies in the erythrocytes of a dog suffering from a severe clinical hemolytic anemia prompted this study to determine and characterize its etiology. We were able to transmit, via the blood of the clinical patient, a causative agent of hemolytic anemia to healthy splenectomized dogs. And according to its morphology, we have identified this agent as *Hemobartonella canis*. We believe that the disease in our clinical patient was activated by intercurrent infection for which the dog was under treatment at the time of admission. Our studies suggest that this may be the general case in non-splenectomized dogs that become infected, but remain as healthy, asymptomatic carriers until intercurrent infections or other stresses occur.

Coccoid basophilic bodies, such as were found in the erythrocytes of dogs no. 3 and no. 4 may readily be confused with the coccoid form of *Hemobartonella canis*, from which we have experimentally distinguished them by the lack of illness following splenectomy. Since both dogs showed similar bodies, without polychromatophilia or other morphological suggestions of increased erythropoesis, we assume that these structures were not Howell-Jolly bodies. However, the finding of both the coccoid and the bacillary or chain forms of the or-

TABLE 5

Dog No. 5	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
3-2-59	12.25	35		12,850	71	2	21	5	
4-17-59	3.15	11		14,750	61	9	29		12 nucleated RBC's/100 WBC's. Hemobartonella positive
5-15-59	2.65	9		15,700	63	4	33		16 nucleated RBC's. Hemobartonella positive
6-30-59	11.40	30		12,150	80		19		Hemobartonella negative. No abnormalities

TABLE 6

Dog No. 6	Hb	Hct	RBC	WBC	N-S Neut.	S Neut.	Lym.	Eos.	Morphology
3-20-59	12.25	37	5.7	17,200	69	2	27	1	
5-15-59	9.40	33.5		13,800	73	5	21	1	Hemobartonella negative.

ganism, associated with clinical and laboratory findings indicative of hemolytic anemia is diagnostic of hemobartonellosis in the dog. Contrary to this, in the cat only the coccoid form of Hemobartonella is commonly seen.

The original patient described in this article was treated with penicillin, dihydrostreptomycin, and blood transfusions, and she made a complete clinical recovery. However, an examination several months after the course of illness still showed *Hemobartonella canis* in the erythrocytes. During the subsequent six months, no relapse was detected.

The experimental dogs in this study were treated with Mepharsen, or untreated, and all recovered from clinical signs of illness. As in the clinical patient, Hemobartonellae were found in the erythrocytes several months after the anemia and other signs of illness subsided.

No significant difference was noted in the recovery of untreated dogs, or dogs treated with Mepharsen, or with antibiotics. In each case, clinical recovery occurred without clearance of the Hemobartonellae from the erythrocytes. Supportive therapy with whole blood transfusions appeared of distinct value.

Since the onset of this study, five other confirmed cases of hemobartonellosis in dogs have come to the attention of the authors. Three were diagnosed at the veterinary clinic of Ohio State University, and the others at a nearby private veterinary hospital.[7] Two of the dogs seen at the university had intercurrent infection with canine distemper.

Summary

Hemobartonella canis was isolated from a clinical patient and transmitted via intravenous injection to healthy splenectomized puppies. This was done serially for three passages. Each splenectomized puppy that was injected with the blood of an animal showing signs of hemobartonellosis became actively infected. One non-splenectomized puppy similarly injected showed no evidence of illness. Puppies which were splenectomized and exposed to actively infected dogs did not become ill prior to inoculation with whole blood from an infected animal. The incubation period in experimentally infected dogs was found to be 13 to 15 days. (Dog no. 1 is an exception. We believe the first signs of illness may have been overlooked.)

Clinically, the outstanding signs seen in experimentally infected dogs were: decrease in activity, palor of mucous membranes, slight elevation of temperature, and dark colored urine.

Laboratory examinations revealed decreased hemoglobin, hematocrit, and erythrocyte counts, also a lymphocytosis, circulating nucleated erythrocytes and other forms indicative of an increased rate of erythropoiesis, and the finding of both the coccoid and chain or filamentous forms of *Hemobartonella canis* in circulating erythrocytes.

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Here each month are published ideas, suggestions and comments picked up by VM reporters.

Small Animal Clinic

Booster Vaccination

It is an error of judgment to assume that in general a dog vaccinated against canine distemper will have a permanent immunity. There is good evidence that one year after such vaccination one-fourth of the dogs will have a very low antibody titer, and a year later there will be a similar drop. A precautionary procedure is to resort to additional annual "boosting" for a year or two after the initial vaccination.

The Rabies Problem

In so far as rabies is concerned, dogs are definitely less susceptible than skunks, foxes and cattle. Cats are apparently so resistant to peripherally inoculated virus that the disease cannot maintain itself in them. In a small percentage of specimens presented for laboratory diagnosis — especially albino mice, dogs, foxes, skunks, and cats, atypical Negri bodies are found that are difficult to differentiate from typical Negri bodies. To make a positive differentiation may take several days. — *Med. Clinics of North America, September 1959.*

Viral Infection

It is informative to note (*Journal American Medical Association*, August 1, 1959) that the virus responsible for the development of contagious canine hepatitis (Rubarth's disease) in the dog is responsible for encephalitis in the fox. Persons who come in close contact with dogs may acquire this viral infection. In human beings it may be a "minor involvement of the liver, or it may develop as a severe disease with hepatic involvement."

Animal Research

Animal disease research, or the use of animals for experimental purposes, is frequently condemned by poorly informed persons. Those taking such an attitude should recall — if they ever knew — that based on animal research such established human procedures as the following are in use: blood transfusions; transplant of skin, bone, eye tissues, and kidneys. All had animal research as a basis.—*R. R. Dykstra, D.V.M.*

State Medical Ethics

A reliable source of information indicates that in Russia the body of a deceased human being belongs to the state, so that tissues of such a being are immediately available for the purpose of establishing tissue banks of bone, skin, blood vessels, and other tissues for use in healing ailing, living humans.

Soviet Scientist Reports

Dr. A. A. Smorodintsev, prominent Soviet virus expert of the Institute of Experimental Medicine, in Leningrad, was a guest at the Annual Dinner Session of the Conference of Public Health Veterinarians, Atlantic City, New Jersey, October 21.

On the previous day, Doctor Smorodintsev had addressed a general session of the American Public Health Association on Soviet work with live viruses to curb influenza, mumps, and measles. New vaccines made from living, but weakened viruses have been developed in the hope of creating long lasting immunity. He indicated that the Soviet vaccine work is based on the research of Dr. John F. Enders of Harvard, who won a Nobel Prize for discovering how to grow viruses in test tubes —and who is working on a similar live-virus vaccine against influenza.

More details on the Soviet flue vaccine will be reported in a future issue of VETERINARY MEDICINE.

Treatment for Bullet Wounds

Bullet wounds are frequently more extensive than is readily apparent. Tissue destruction is determined by tissue resistance and characteristics of the missile — such as mass, velocity, size, shape. Energy transmitted from the missile violently displaces the tissue from the missile tract, producing a pulsating cavity that may be 30 times larger than the bullet itself.

To prevent infection, all nonviable tissue must be excised. The incision must be adequate to permit one to visualize the entire wound. Since tissues differ in structure and blood supply, the amount of devitalization will vary with the layer. Both skin and fascia are resistant to the effects of perforation of high velocity missiles, and only limited excision is required.

Debridement of muscle demands the greatest exercise of judgment. The following criteria for muscle viability are definite:

1. Dead muscle may be dark or pale, depending on the amount of local bleeding and whether the main blood supply to the muscle has been destroyed. Intensity of color change is directly related to the time between wounding and treatment.

2. Dead muscle is soft and mushy, whereas normal muscle is firm and rubbery.

3. Healthy muscle contracts when pinched or cut. Lack of contraction is proof of nonviability. Debridement must be continued until contractible muscle is encountered.

4. In viable muscle, hemorrhage is proportional to the size of the vessels cut. In devitalized muscle, fresh bleeding does not occur.

Excision of bone is limited to small fragments separated from the periosteal attachments. In wounds of the head, particularly, every effort should be made to conserve bone, no matter how small the piece. In the extremities, large fragments of bone, even when detached from the periosteum, may need replacement to prevent non-union.

Other tissues and organs are debrided according to differences in sensitivity to devitalization. Wounds of bowel or lung require less excision than those in the liver or other solid viscera. Conservatism is recommended for peripheral nervous tissue.

All wounds should be flushed with saline solution, and particular attention should be paid to hemostasis to prevent accumulation of a medium for bacterial growth.

Delayed closure, four to ten days after debridement, permits evaluation of cleanliness and prevents locking in of infection. Healing is not impeded. Because the lytic phase of wound healing requires seventy-two to ninety-six hours, clean wounds at this time contain only a slight amount of granulation tissue. After coaptation of the edges of the wound, the productive phase of healing takes over to produce delayed primary healing.

Wounds of the head and neck may be closed primarily because of the excellent blood supply in these areas.—*Postgrad. Med., 26:34, 1959.*

by

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Control of Internal Parasites In Swine

A SURVEY[1] ON THE PREVALENCE OF SWINE ASCARIDS conducted in 1920 reported 41% of swine intestines collected from slaughter houses in Chicago carried this worm. A 1934 survey[2] in southeastern swine established the prevalence of swine ascarids to be 74%. A 1945 survey[3] of Georgia swine established a prevalence of 68% for swine ascarids. Based on a fecal smear technic,[4] it was reported in 1949 that 34% of 180 to 225 lb. hogs packed in Chicago were infected with ascarids. A 1955-56 Wisconsin survey[5] demonstrated the incidence of ascarids in the population examined to be 65.4%.

The survey of helminth infection in Wisconsin market weight swine established that animals acceptable for human consumption carried an average of 463.3 worms of 3.5 genera to the packing plant in Madison.

These surveys over a 36-year period do not indicate a decline in helminth numbers, and yet standards of management for swine, sanitation and feeding, steadily improved over the same period.

It can be stated categorically that absolute control of infectious disease will rest upon the most rigid standards of sanitation and careful management. In actual swine production, however, the expense of such rigid sanitation presently must be reckoned an important deterrent. Physical facilities for proper management also are cost factors to be reckoned with. The presumption appears justified that increased concentration of swine and intensive market schedules will prevent complete dependence upon sanitation and management for the control of internal parasites.

Very simply, an increasing number of swine concentrated into relatively smaller areas will increase the opportunity for exposure to worm infection. The surveys referred to above did not indicate that the 1955-56 standards of sanitation and management were more effective barriers to worm infection than standards of 30 years ago. Evidently concentration of larger numbers of animals help helminths to surmount the

more efficient standards.

That physical facilities in themselves are not effective barriers to worm infection in the absence of careful sanitation is evident to every parasitologist who has worked with swine parasites. For example, every investigator has records of more helminths in swine maintained on concrete than he could establish in swine reared on dirt lots, and at the same farm.

The emphasis placed upon proper manure removal by the parasitologist is derived from the fact that the ova of the parasitic worms which insure the perpetuation of the parasites are passed almost entirely in manure. The parasitologist, in general, has attempted to convince farmers of the value of sanitation based solely upon the removal of worm eggs and the resultant decrease of amount of exposure available. From the standpoint of practicality, parasitologists should have spent the past 30 years attempting to convince swine farmers of the value of the manure as fertilizer. Presumably, few farmers have scraped hog manure from the conviction that they were removing worm eggs from the vicinity of their herds.

In the absence of effective vaccines to reduce the population susceptible to worm infection, parasitologists have adopted systems of treatment based upon anthelmintics to reduce the infection available and aid in the control of worm infections. Currently, parasite control programs should be in a second phase in the use of drugs for worm infections.

Anthelmintics

In the first phase anthelmintics were used to relieve physical distress of individual pigs diagnosed to be infected by large numbers of worms, principally ascarids. The drugs were designed to eliminate the mature worm from the digestive tract and the standard for efficiency of the anthelmintic was primarily the death of the parasite.

The drug of choice in the 1920's for the removal of *Ascaris lumbricoides* was Oil of Chenopodium, the use of which was followed by administration of a purgative to remove the dead worms. Such single curative treatments actually had little relation to control in that they did not serve to reduce appreciably the total number of infective ova already present in the environment. Moreover this full curative treatment was effective against a single type of worm infection, ascarids.

The earliest anthelmintics required their administration directly to the individual pig. By standards of present day swine production, the cost of labor involved in treating pigs individually restricts control programs based upon treatment of pigs as individuals.

The anthelmintic phenothiazine originally appeared as an ascaricide for swine but received limited acceptance only. Use of this drug required individual treatment of swine, and, in full curative dosage, it frequently was toxic.[6,7,8]

The first successful drug for mass treatment of herds of swine infected by ascarids was sodium fluoride.[9] When properly mixed into the feed at the rate of 0.75-1.00%, this anthelmintic proved amazingly efficient against the larger and mature specimens of ascarids. Its efficiency is somewhat less against specimens of the worm less than 2 in. long. With the development of sodium fluoride as an anthelmintic, parasitologists had achieved ease of administration and treatment of an entire herd; it had been established long before that it was impossible to diagnose ascarids infection through visual examination of the exterior of the individual pig.

Unfortunately, another desirable feature of anthelmintics had not been stressed enough when sodium fluoride became the drug of choice in the latter 1940's. To put it as succinctly as possible, most farmers learned to use sodium fluoride the hard way. The drug has a narrow margin of safety, and must be administered carefully mixed to achieve even dispersal throughout dry, not wet, feed in order to avoid disaster.

The safety margin of swine anthelmintics was increased greatly by the development of cadmium products in the late 1940's and early 50's.[10,11] The efficiency of the cadmiums as ascaricides is somewhat less than that of sodium fluoride, but the safety margin is much greater. The cadmiums also were designed for mass treatment of the herd population of worms within the digestive tracts of the swine.

If the internal parasite fauna of swine had consisted solely of the large internal round worm *Ascaris lumbricoides*, the problem might have met a fair solution. From its first discovery the very size of the swine ascarids had drawn to its presence the label of "important infection." It is true that in pure infection, in sufficient numbers, the worm is known to kill individual pigs, to severely stunt the growth of others and to interfere markedly with the feed conversion ability of all infected swine. Unhappily, worm infections are comprised of a single species only on extremely rare occasions. On the average, a worm infection is comprised of an aggregate number of species, some of which, at least, clearly have been established to be severe pathogens in their own right. None of the older swine anthelmintics had a spectrum of activity much greater than action against the ascarids.

It is possible to direct anthelmintics in a system of periodic full curative treatment to move toward over-all control of worm infection and away from the concept that such treatments relieve only the distress of individual animals. When full curative treatment is employed with relation to the life cycle of ascarids, then it is possible to time administration of the anthelmintic so that worms in the digestive tract are removed just prior to or at the beginning of egg production. This concept moves anthelmintics from the simple status as worm killers to a second approach to the control of worm infections, an attack upon the reproductive capacity of the parasites.

From a practical standpoint, however, a routine of periodic full therapeutic treatment will not accomplish control of parasites since the system will break to pieces when it encounters the average farmer's faulty memory. Since all sows at a given farm do not farrow simultaneously, it is impossible to direct the farmer to treat each pig for ascarids with a full curative treatment at intervals of every 50 days from birth through a weight of 150 lb. without adding to his labor costs. Such a system as has just been described is possible when sows and their litters, and then the litters of weaned pigs are moved through what can be described as a "worming house."

In 1954 two piperazines were brought to the United States from England. These two piperazines were introduced primarily as ascaricides but they also possessed extremely useful activity against other parasites in swine, principally the nodular worms.[12,13]

The Piperazines

The piperazines can be used to attack internal parasites on a herd basis. Because both soluble and insoluble preparations are available, administration of these drugs does not involve much extra labor; they have been administered effectively in drinking water and mixed in the feed. The piperazines were not designed as worm killers, but rather they function to drug the worm so that it cannot maintain itself against peristalsis within the host digestive tract. The safety margin of the piperazines has been satisfactory.

Because of their ease of administration the piperazines can be incorporated readily into systematic periodic treatment of the herd. The disadvantage attached to the piperazines is that they can be used in full curative dosage only. This fact restricts their usefulness more to specific "treatment" of infected herds. It prevents their use in overall control which requires more continuous subtherapeutic treatment.

From a parasitological standpoint the piperazines no doubt have their greatest usefulness in removing the bulk of ascarids and nodular worm infection from feeder pigs as such animals go into the feedlot. The immediate advantage of their use in overcoming heavy infections in severely parasitized pigs is self-evident.

Anthelmintics should serve at least three objectives when employed in control of worm parasites, in relation to the life cycles of the parasites. A drug can function to destroy mature worms within the digestive tract. It might also destroy infective larvae upon their first entrance into the host. It should, and this may be the most important of all, affect the reproductive capacity of the parasites to prevent future re-exposure of the same or of succeeding crops of pigs at a given farm.

From the standpoint again of control of worm parasites as distinct from treatment of specific infection, the newest swine anthel-

mintic, hygromycin, incorporates more desirable features of an anthelmintic than any other yet produced.[14,15]

Hygromycin

The anthelmintic hygromycin can be used in a continuous system of attack in subtherapeutic amounts. In fact, there is no "full curative" dosage of hygromycin for an individual pig. This anthelmintic supports the proposition that worm infections must be attacked primarily on a herd basis. Without a "curative dosage" the safety margin certainly is less critical. Daily administration of the drug to attack parasites emphasizes the fact that exposure to infection occurs daily and continually throughout the entire herd.

In addition, hygromycin has increased the spectrum of anthelmintic activity of drugs useful against parasites in swine from the ascarids and a portion of the nodular worm population to swine ascarids, the full nodular worm population and the whipworm. Evidence has been obtained at the Wisconsin Veterinary Parasitology laboratory that hygromycin exerts an exact action against the red stomach worm and the swine lungworm.

A first action of hygromycin against internal parasites evidently is directed at the capacity of the females to produce eggs. The drug apparently is fatal to the worms themselves, but this action seems to be a cumulative one. Rapid expulsion of mature ascarids, so common following piperazine therapy, is not characteristic of hygromycin. Fairly rapid expulsion of worms has been observed of pigs on complete feed when the amount of hygromycin consumed has reached levels of 100 to 150 mg. per animal per day.

The introduction of an anthelmintic into the ration of swine on a continuous daily subtherapeutic system has enabled parasitologists to move more directly toward the measurement of production loss due to parasitic infection. Customarily parasitic infections are described either as clinical, evident from pronounced growth failure and even mortality, or subclinical, that is, with no determinate effects of the presence of the infection recorded except when production is measured in terms of feed conversion. The absence of exact production studies with respect to subclinical parasitism has made it difficult for parasitologists to direct attention to the fact that the subclinical infections are more costly in the long run and constitute the continuing reservoirs which maintain the infections in every herd of swine in the country. It is hoped that widespread usage and investigation of an anthelmintic such as hygromycin now being conducted throughout the country will establish this latter fact.

Pathology of Helminth

A remark should be made with respect to investigations now being conducted in an attempt to elaborate the role of internal parasites in swine in the transmission of virus infections. Prevention of virus infection in swine evidently will be linked to prevention of helminth infection.[16]

The swine lungworm was identified as a reservoir and intermediate host for swine influenza virus in 1941.[17] Relationships between Ascaris and vesicular stomatitis apparently are being established. It is known that other relationships between Ascaris and swine respiratory infections and Ascaris and swine cholera are being studied. Such research identifies a derived pathology of helminths.

This discussion of the control of internal parasites in swine has not been intended to separate these infections from the other bacterial, viral, and protozoan infections which also are involved in swine production.

The dominant feature of present-day efficient swine production is its concentration of the animals. An estimate is prevalent about the country that our entire annual swine production eventually can be achieved on as few as 60,000 farms. It is customary, therefore, for disease investigators to view the future with some alarm. The expression is given that such concentrations of livestock may also concentrate the disease problems, and indeed, the history of the worm parasites in American swine discussed in the surveys at the beginning of this presentation is in agreement with such a view.

On the other hand, we might also consider that continuing concentration of live

stock production will present disease investigators with their greatest opportunity to bring the infections under control. The principles of disease prevention are nowhere more widely accepted than at our largest swine enterprises. This last certainly is true of control methods for internal parasites in swine.

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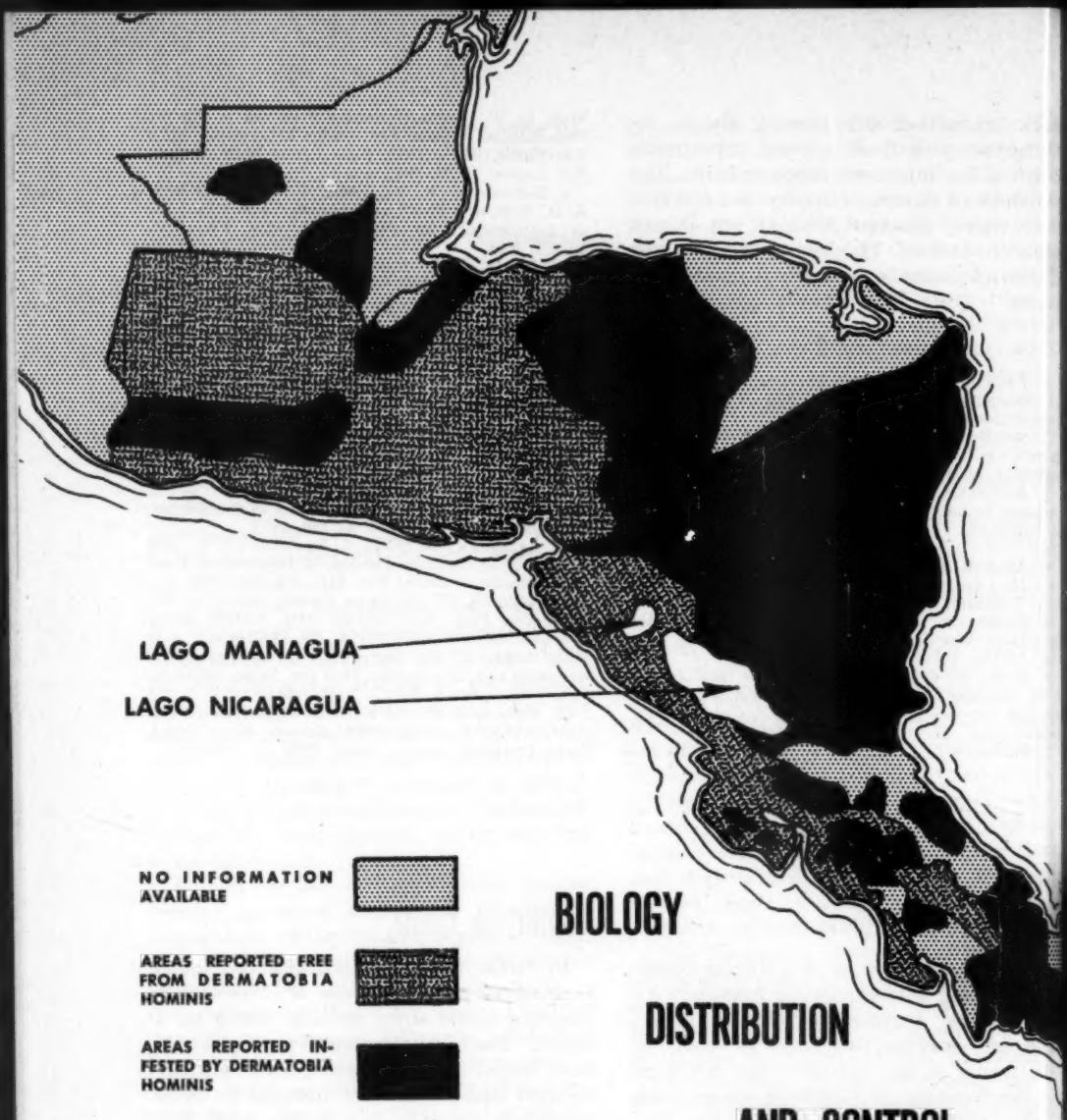
Bovine Lymphocytoma

Bovine lymphocytoma is a disease condition observed with increasing frequency by practitioners. Outstanding clinical symptoms are extreme protrusion of one or both ocular globes (possibly the result of the development of lymphoid tissue back of the globes), enlargement of the prescapular and prefemoral lymph nodes, and in the later stages paralyses of the hind limbs— the result of lymphoid tissue pressure on motor nerve trunks. On rectal palpation large masses of lymphoid tissue are frequently detected. Embarrassed breathing indicates involvement of the pulmonary organs. In some cases the white cell count is as high as one million, though usually much reduced as the inevitable end approaches. When a single eye is affected it is sometimes excised as palliative treatment provided no other clinical symptoms are evident.

Sterility in Cattle

In Great Britain a warning has again been issued against the use of stilbestrol in breeding cattle since sterility could be a sequel. The same warnings have repeatedly been issued in the United States. Recommended dosages are not harmful to meat producing animals, nor is the meat deleteriously affected for human consumption, but excessive dosage could make the meat have an altered appearance.

Again it is reiterated that there are occasions when home mixing of hormones and animal feed, due to swallowing or inhalation, can be toxic to the person. Research in Britain is being carried out to determine whether excretions of meat producing animals being hormone fed contaminate pastures to the point where they are unsafe for breeding stock. At this time "it cannot be positively asserted that there is no risk."



BIOLOGY DISTRIBUTION AND CONTROL OF DERMATOBIA HOMINIS

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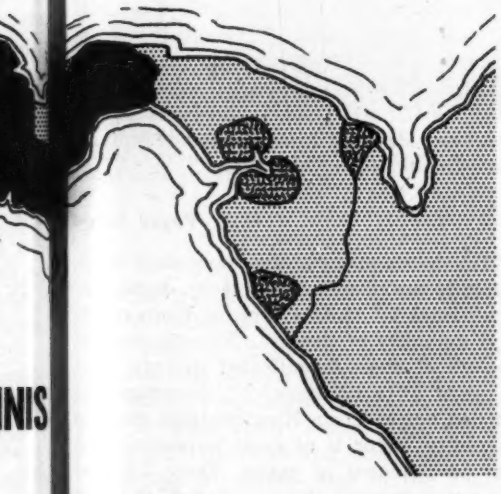
THE TROPICAL WARBLE FLY or torsalo (*Dermatobia hominis*) is an insect peculiar to the Latin American continent. In spite of its great economic importance as a common parasite in cattle, *Dermatobia hominis* has received little attention in veterinary literature and is dealt with rather summarily in entomology and parasitology textbooks.

Classification and Description

The classification of *Dermatobia hominis*, according to the textbook of C. T. Brues and L. Melander: *Classification of Insects* (1932), is as follows:

Order—Diptera; family—Oestridae; subfamily — Dermatobiinae; genus — Dermatobia; species—hominis.

The adult is a robust fly, about 12 mm. in length. Its head is yellow, the upper parts darkened. Its thorax is dull blue and the abdomen metallic blue. Eggs are about 2 to 3 mm. long and 0.7 to 0.8 mm. thick. The outer part of the egg is formed by a white shell with an operculum. They are



covered by an adhesive material which solidifies upon contact with the air.

The first stage larva is subcylindrical, somewhat narrower posteriorly. The third and fourth segments are thickly set with small spines. The fifth to seventh segments have, in addition to smaller spines, a ring of heavy spines. The eighth and 12th segments are bare. After the first moult, the larva becomes pyriform with bare posterior segments remaining narrow, but the more heavily spined anterior end becomes ovate to globular. The mature larva is elongate-oval with the heavy spines somewhat reduced. The posterior spiracles are sunken in a cavity. The anterior spiracles are prominent, elliptical and flower-like in appearance.

Biology and Life Cycle

Imago. In captivity the life span of the adult fly ranges from one to 19 days.[20,17,16] One female produces 400 to 900 eggs.

Oviposition. The most peculiar biological feature of the *Dermatobia hominis* is the way in which its eggs are transmitted to the mammalian host, *i.e.*, by means of intermediary insect vectors.

Insects carying Dermatobia eggs were observed as early as 1896[6] and 1913.[21] Nevertheless, it was not until later that it became apparent that oviposition on other insects is the usual way for the female fly to transmit her eggs to the animal host. This was first asserted in Guatemala[13] and Venezuela[19] and subsequently confirmed by several writers,[1,3,4,7,9,11,12,16,17,18] one of whom[2] has given a detailed description of the adult fly's method of capturing insects and oviposition behavior. A few observations on direct oviposition on the host and on other objects such as plants and clothes are also reported.[10,20] However, there is reason to believe that the direct oviposition is the exception and that transmission by means of egg vectors is the rule.

When ready to lay eggs, the female seizes moderate sized flies or mosquitoes, often catching them mid-air. The vector insect is held closely under the thorax while the Dermatobia attaches the eggs, often as many as 50 to 60, in quick succession to the ventral and lateral surface of the vector's abdomen.

Egg vectors. Dermatobia hominis seems to have little predilection for the insects that serve as egg vectors. Generally it seems to prefer day flying mosquitoes or small flies. The tick, *Amblyomma cayennense*,

has been observed as an egg vector in a single case.[4] A list of 36 species of insects observed as egg vectors in seven Latin American countries has been compiled.[16]

Larval Stage

According to most writers, the embryonic development of the larva begins within the egg before it has been transferred to its animal host. A case in which a larva remained alive within the shell for 24 days has been reported.[26]

When the egg has been deposited on the animal host, the larva, possibly through the body heat of the host, pushes open the operculum and emerges from the shell to penetrate the skin. Observations on the behavior of the larva immediately after emerging from the shell are insufficient. The most detailed account is given by a writer who cultivated a larva in his own body.[5] There is, however, reason to believe that the larva penetrates into the skin immediately after emerging and not far from the site of deposition.

The larva lodges in the subcutaneous tissue. Contrary to the Hypoderma species, no migration takes place. The Dermatobia larva develops underneath the place where it penetrates into the skin. As the larva grows, a swelling or warble begins to form, measuring about 2 to 3 cm. in diameter. The skin over each swelling becomes perforated, and the larva then lies with its posterior stigmal plate directed towards the pore for the purpose of respiration. The reaction of the host is the formation of a pus filled abscess around each larva. Warbles caused by the larvae of *Dermatobia hominis* are similar in appearance to those of *Hypoderma bovis* but slightly smaller. Sometimes various larvae lodging closely together use the same opening for respiration. Two or three moults occur within the host.[5,26] Half grown larvae can be successfully transplanted from one animal to another.[23] The duration of the larval stage in cattle is five to seven weeks. Once the larva has reached maturity it enlarges the opening of the skin and drops to the ground where it pupates.

The number of larvae harbored by individual hosts varies from a few to more than

Insect vector carrying eggs of Dermatobia hominis.

a thousand. In cattle, larvae develop in greatest numbers on the front quarters, the neck, head, upper parts of the front legs and the chest. Hind quarters are usually free from larvae, probably because the animal will chase away egg vectors with its tail. Dark coated animals usually become more heavily infested than light colored ones.

Warbles appear to be painful. Undoubtedly they tend to lower the condition of the animal, although the health of many heavily infested individuals appears to remain relatively unaffected. Great damage is caused to hides. Hides of heavily infested animals may be said to have no value.

Pupal Stage

The development of the pupal stage is apparently influenced to a large degree by environmental factors such as temperature and humidity of the soil. The duration of the pupal stage is indicated to vary from between 20 to 120 days.[5,16,17] Investigations carried out in Costa Rica[16] suggest that the humidity factor is of great importance for the development of pupae. Only 3.1% of the larvae transplanted or "seeded" in boxes with dry soil developed into adult insects, whereas 40.6% of larvae "seeded" in humid soil reached the image stage.

Poor development in dry soil appears to throw some light upon the seasonal incidence of Dermatobia infestations observed

in most areas. A remarkable decrease of Dermatobia infestations is noted in most places of Central America during the dry season. This decrease is especially pronounced in areas where long periods without rainfall are common. It may be assumed that this decrease is due to the fact that the dried out soils in such areas offer unfavorable conditions for the development of the pupal stage.

The Dermatobia hominis larvae develop in any warm-blooded species, including man. An infested scalp of a child is shown here.

Hosts

Bovine species appear to be the natural hosts of *Dermatobia hominis*. However, the larvae seem to be able to develop in any warm-blooded species including man. Besides cattle, Dermatobia larvae have been found in goats, sheep, swine, dogs, rabbits, guinea pigs, monkeys and other mammals. The larvae are rarely seen in the equine species.

Cases of Dermatobia infestations in human beings occur frequently, especially in heavily infested areas. Children appear to be more frequently attacked than adults. Unprotected parts of the body, such as legs, arms, neck and head are the most attacked. Infestation results usually in a relatively harmless, although sometimes painful, boil-like inflammatory condition. Complications may occur when delicate tissues such as the eyelids are involved. A fatal case of *Dermatobia hominis* in the brain of a 1½ year old child has been reported.[6]

Methods of Spread

Movements of infested cattle appear to be the most common way of spread of *Dermatobia hominis*. Little is known of the flight habits of the adult Dermatobia fly. Nor is it possible to give estimates as to the distances covered by the egg-carrying dipterous vectors. It is therefore difficult to evaluate the role which the fly itself and the egg vectors may play in the spread of this parasite. Another source of spread is infested wildlife.

Distribution

The geographical distribution of *Dermatobia hominis* covers most South and Central American countries situated in the tropical zone, ranging from northern Argentina, Paraguay, Bolivia and Peru in the south to the central parts of Mexico in the north. Chile is the only South American country from where *Dermatobia hominis* has not been reported.

Altitudes of approximately 1,000 to 5,000 feet above sea level offer the most favorable environmental conditions for *Dermatobia hominis*. In general the zones climatically favorable for the cultivation of coffee are also favorable for the existence and propagation of the tropical warble fly. Areas situated at or just above sea level are usually little affected by it.

As far as the Central American isthmus is concerned, its existence is mainly limited to the altitude range noted above. Infestations in areas below about 1,000 feet do occur. There are also large cattle producing regions in the appropriate altitude range in which Dermatobia infestations do not occur, although infested cattle have been introduced into such areas time after time. Infested animals brought into such areas spontaneously disinfest themselves as they do also in many areas situated just above

sea level. Usually no infestation of local cattle takes place and no reinfestation of the introduced cattle occurs. The parasite simply dies out. Whether this is due to unfavorable soil conditions, unfavorable climatic conditions, or the absence of appropriate egg vectors has yet to be determined.

It is a general observation in Central America that cattle maintained in pastures with a heavy growth of underbrush in the vicinity of densely wooded areas become more heavily infested than cattle kept in clean pastures removed from densely wooded areas.

There is good reason to assume that the density of the Dermatobia population in a given area may be determined by the following factors: (1) existence of cattle, (2) climatic conditions, (3) soil conditions, (4) presence of egg vectors. According to this, a high incidence of Dermatobia infestation is thus to be expected in areas where these factors are optimal, *e.g.*, areas with a dense cattle population, a short dry season, humid soil and many potential egg vectors. Areas with a low incidence of Dermatobia are then such areas where one or more of these factors are present to a lesser degree, *e.g.*, areas with a low cattle population, a long dry season, dry soil and few dipterous vectors.

Methods of Control

Methods that have been used for the control of the tropical warble fly are directed against (1) destruction of the encysted larvae and (2) prevention of the deposition of eggs and subsequent penetration of the larvae into the skin of the host. So far no measures have been designed for attacking the adult fly, the egg vectors or the pupae.

A number of chemical compounds with insecticidal effects have been tested against the tropical warble fly through the years.

Larvicidal effects have been attributed to the following chemicals: Rotenone and DDT,[24] Smear EQ-335,[25] nicotine sulphate, BHC, parathion and rotenone,[26] BHC, chlordane and toxaphene administered hypodermically or orally.[30] Others have been applied as preventives due to their residual effects. Some of the tests cover short periods and in some cases reported results may have been influenced by natural seasonal fluctuations of incidence of infestation. As far as can be determined, in no case has area eradication been obtained as a result of chemical treatments. A notable reduction of infestation has been achieved in some places, however.

Destroying the Encysted Larvae

The effect of systemic insecticides on Dermatobia larvae has been tested only on a limited scale. In a test carried out in Panama[8] Dow ET-57 (Dow Chemical) was administered orally to 25 head of cattle at the dosage of 100 mg. per kg.; 72.6% of the larvae was killed; 81.3% kill was obtained in 14 animals at 150 mg. per kg. Younger larvae were more susceptible to the treatments than older ones.

Preventing Penetration of Larvae Into the Skin

Some of the chlorinated hydrocarbon insecticides are considered in this category. Spraying and dipping with these insecti-

Steer infested with larvae of Dermatobia hominis.

cides may sometimes kill a small number of larvae. Experience shows, however, and some writers[10,15,29] confirm that most encysted larvae are too well protected to be affected by ordinary spraying and dipping procedures.

The ability of these insecticides to reduce the incidence of Dermatobia infestations when applied regularly is due rather to their residual effect which may affect the dipterous egg vectors or the newly hatched larvae.

The chlorinated hydrocarbon insecticides were introduced into Brazil in 1949 for the control of ticks, lice and flies.[10] Although no immediate effect was observed on the encysted larvae of Dermatobia infested cattle, subsequent reduction of the infestations was noted in the regularly treated cattle.

Subsequent field tests carried out in Brazil[27,28] showed that 3% BHC powder applied as a dust and 1% emulsifiable toxaphene as a spray were highly effective in reducing the infestations.

The efficacy of the treatments based on the use of insecticides with residual effect is somewhat impaired by the fact that the heavy tropical downpours appear to reduce considerably the residual effect in that particular season where it is most needed. The results of the application of different formulations during the rainy season in Brazil[28] showed that BHC as dusts was inferior to emulsifiable BHC and toxaphene applied as sprays, but none of the formulations were able to maintain the infestations at a satisfactory low level.

Regular spraying with emulsifiable toxaphene during a two years field test in Costa Rica[15] resulted in a reduction of Dermatobia infestations. It was, however, not possible to free the animals completely from infestations during this period. The hairs of the toxaphene sprayed cattle were practically free from active insecticide 14 days after spraying, as measured by bioanalysis.

The effects of spraying with emulsifiable Toxaphene and Aldrin were compared with BHC in wettable powder suspensions during some months of the rainy season in Costa Rica.[14] They caused progressive and significant reduction in infestation but did not differ significantly in effectiveness.

Discussion

Various aspects of the biology, ecology and control of the tropical warble fly are not yet fully clarified. It appears that more precise research data are necessary regarding the following subjects:

1. Influence of climatic conditions on the propagation of *Dermatobia hominis*.
2. Influence of ecological factors on the development of the pupa.
3. Flight range of the adult insect.
4. Occurrence of direct oviposition.
5. Efficacy of systemic insecticides.
6. Adequate procedures for area eradication.

The chlorinated hydrocarbon insecticides applied regularly as dippings or sprays are capable of reducing the Dermatobia infestations. It is unlikely however, that it will be possible to achieve complete eradication by means of these compounds. The attention is therefore focused on the systemic insecticides which have proved effective against the Hypoderma species.

Area eradication of *Dermatobia hominis* by the use of systemic insecticides would theoretically involve more aspects than area eradication of the Hypoderma species. The Hypoderma species produce only one generation a year. The periods in which the animals become infested is limited to a certain season and they are existing exclusively as larvae during the larger part of their life cycle. *Dermatobia hominis* produces three generations annually under favorable conditions, the duration of the larval stage is relatively short and infestations take place throughout the year. For the purpose of area eradication it would therefore be necessary to effectuate periodical treatments with intervals less than the minimum time required for the development of the larval stage.

Summary

The literature pertaining to the biology and control of *Dermatobia hominis* (L. Jr. 1781) is reviewed. Data regarding the geographical distribution of *Dermatobia hominis*, with particular reference to Central America, are presented. Some of the factors to be considered in area eradication

based on the use of systemic insecticides are discussed.

Acknowledgments

Dr. E. Harrestrup Andersen is a veterinary officer of FAO (Food and Agriculture Organization of the United Nations) attached as animal health adviser to the Central American organization, OIRSA (Organismo Internacional Regional de Sanidad Agropecuaria), Managua, Nicaragua. The photograph of the egg-carrying insect vector has been published with the permission of Dr. J. de Alba.

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Editorial Comment

THE FUTURE OF THIS PRACTITIONER'S JOURNAL

The stockholders of Veterinary Medicine Corporation announced December 1, 1959, that they have entered into an agreement which will provide for the acquisition of this corporation's controlling stock by Dr. C. M. Cooper, present editor of VETERINARY MEDICINE. Mrs. Robert L. Anderes, Chairman of the Board, points out that completion of these negotiations will assure the continuity of this publication's 55 years of dedicated service to the veterinary profession as pioneered by the late Dr. Robert L. Anderes and earlier by Dr. D. M. Campbell.

VETERINARY MEDICINE has progressed from the small monthly bulletin in 1905, with only local distribution, to first place among veterinary publications having international circulation and scope.

In earlier days, VETERINARY MEDICINE stressed the importance of swine practice when practitioners refused to accept a call to attend illness in swine. It established a section on canine medicine and surgery (now Small Animal Practice) in 1912 when even in large cities there were but one or two practitioners specializing in pet practice.

It will continue to lead, not push, the veterinary profession in future years the same as it has so ably in the past. The editor appreciates the responsibilities that the future demands and will pursue the present policy of "Growing Service to a Growing Profession" vigorously through the pages of this monthly journal and the fast growing VM Newsletter service every ten days.

The editorial policy of this publication was clearly set forth by the late Doctor Anderes when he stated that "VETERINARY MEDICINE is dedicated to explore every possible lead of potential value; encourage correspondence with the best qualified; keep alert to new ideas; sound out newer information, and present these items to the practitioner at the earliest possible date."

In this respect, this journal will continue to function as an Open Forum with ethical restrictions. Anyone qualified to have an opinion may be given space to present that opinion exactly as he would from a speaker's platform. Such technical material is presented over the author's signature. All matters will be open to critical analysis. Original articles offered on these pages will bridge the gap between conclusions of research work and experience of tried and successful practitioners. A procedure in common use one day may be modified or even condemned to make room for a better way tomorrow. To the end of giving practitioners the full picture of perpetually converging opposites, VETERINARY MEDICINE is humbly dedicated.

Special Report

Veterinary-Nutrition Meeting

Veterinarians and representatives of the feed industry from an eight state area attending the second annual Midwest Veterinary Nutrition Meeting in Kansas City last month agreed that while numerous differences remained to be resolved, the feeder could be served most efficiently through mutual cooperation. Plans for the long term continuation of this program included the following proposed objectives:

As a public service to the livestock producer it was recommended that a permanent committee called the Midwest Veterinary Nutrition Council be organized. Two members from each state veterinary medical association of the eight state area are to be included on a Committee Council. In addition the Midwest Feed Manufacturers' Association is to appoint a like number of feedmen and/or nutritionists to serve on this Council. Council members shall elect their own officers and executive committee.

As expressed in the plan of operation, the purpose of this Council should be:

1. Provide for continuation of the Midwest Veterinary Nutrition Conference.

2. Promote continuation of grass roots meetings encouraging greater understanding and cooperation between the veterinarian and the local feed dealer and salesmen.

3. Encourage the working together of veterinarians, feed industry members, land grant colleges and universities and all institutes of research in developing jointly, uniform management recommendations so that all segments of service to the farmer tell the same story.

4. Encourage more basic research on the effects of stress conditions on nutrition requirements, and production performance.

5. Encourage more exchange of information and joint research projects between veterinary medicine and animal husbandry departments in colleges and universities.

6. Encourage more industry — college seminars with animal husbandry and veterinary medical departments.

7. Encourage change of curriculums to keep abreast of rapidly changing conditions.

8. Encourage a more ethical approach to sale of agricultural products. There is concern over some current indiscriminate advertising.

9. Encourage the veterinarians to confer with feed manufacturers as to formulations and feeding problems; similarly, feed manufacturers to consult veterinarians on disease problems.

10. Prepare an annual progress report of activities to be included in print in the transcript of the Veterinary Nutrition Conference as well as suggestions for work to be carried on in the following year.

The meeting program excelled last year's highly successful effort to provide one of the most practical, fact filled sessions ever held on the popular subject of disease and nutritional relationships. A major portion of the program dealt with the rapid changes in agriculture as they relate to veterinary service and nutrition. The following abstracts will be supplemented by complete papers in future issues of *VM*.

Vertical Integration

Vertical integration of the livestock industry does not loom as some big specter that is going to wipe out the veterinary profession. It is, however, going to bring some changes. The man who is willing to go along with the concept of preventive medicine and mass treatment is likely to have less adjustments to the new contract arrangements than the man who depends mainly on calls to treat individual animals as his main source of livelihood.

When integrated operators first put their broilers or layers out on a farm, they wanted someone who could really safeguard the health of these birds. Probably they would have used veterinarians if enough were available who were trained to do the job. However, what happened was that the feed companies and others trained their own field service men.

The same situation could arise in the swine business as more production moves under contract. However, it need not happen. At this point, most of the contracts used in the midwest are such that the hogs belong to the farmer and he is responsible for their health. Under this arrangement the veterinarian's position is no different than it has been.

One factor is important. Contracts usually involve fairly large feeders. They use a lot of commercial feed. The feed company or the dealer has a fieldman calling on them regularly. He is a trained livestock man who also knows a lot about disease and disease prevention. He wants the farmer's stock to be healthy and make good gains so that it reflects favorably on his brand of feed.

As veterinarians you need to recognize that the feed business is highly competitive. Although this feedman's company may have a policy against his doing any veterinary work, he is under terrific pressure when the big feed customer says, "George, how about helping me vaccinate my hogs this afternoon?" If the fieldman knows what to do, it's hard for him to keep from making recommendations.

In Missouri a definite effort is being made by feed companies and veterinarians to cooperate.

In instances where the integrator owns the hogs on a farm, you can rest assured that he is going to make certain that health of the drove is protected. The contract is usually written so that the integrator pays the veterinary charges. In this kind of situation, your client is the feed dealer, not the farmer. The feed dealer or manufacturer has no reason to want to get into the veterinary profession. However, he has to operate on a narrow margin and he is not going to be happy with a veterinarian who cannot handle his flock or herd as a group and keep them reasonably healthy.

It seems very likely that processors or feed dealers who have livestock or poultry under contract will be using a reliable veterinarian on a retainer. Probably the same will be true of the larger farm feeders. They will make an arrangement with practitioners to call at the farm regularly, inspect the stock and prescribe treatment.

Commercial cattle feedlots and dairy cow pools constitute another form of integration. Operators of feedlots often do much of the simplest work in treating animals, but also have a veterinarian on a retainer or fulltime. Here again, margins are narrow and everything is handled on a group basis if possible, avoiding individual treatment.

The dairy cow pool that has had the most publicity is "Fashion Farm" in Iowa. They had some real problems last winter. They could not have had much worse winter weather for the first year's operation.

Interest in cow pools seems to be high. Some of them set up on a corporation basis expressly for investors instead of farmers in the neighboring area are likely. Certainly someone is going to have to care for the hundreds of cows involved in these huge operations.

Certainly there must be veterinarians in the picture to handle the ever-increasing disease problems. Such new developments as Nebraska's disease-free swine repopulation plan will require skilled professionals. Several Midwest veterinarians are getting set up to provide breeding stock that is free of atrophic rhinitis and virus pig pneumonia. A hysterectomy operation is performed on the sow in order to obtain these disease-free

litters. Certainly this is no job for amateurs. —*Forest L. Goetach, Doane Agricultural Service, Saint Louis, Missouri.*

Nutrition and Mastitis

In spite of all the work that has been done and the advent of antibiotics and other therapeutic agents, mastitis continues to be a disease of considerable mystery as to etiology. As a result it is only natural that there should be incriminations as to etiology based on pure speculations — such as the alleged effect of specific feeds.

Based upon extensive work in our laboratory ingested material could theoretically, produce mastitis. This work indicates that the exacerbations in chronic mastitis is an allergic phenomenon in which the offending micro-organism is the allergin. Early experiments showed that as acute clinical symptoms of mastitis can be produced by the introduction of killed *Streptococcus agalactiae* via the teat meatus as occurred in natural infection.

To obtain this reaction either heat or phenol-killed bacterins were infused into the udder. The first infusion caused no detectable reaction either clinically or in the milk. A second infusion of the bacterin, however, caused as severe a reaction as would the exacerbations in chronic mastitis. Acute swelling, heat, tenderness and visibly abnormal milk occurred. Each subsequent infusion of the bacterin at ten day to two week intervals brought about the same reaction. In these experiments living bacteria as causative agents were ruled out by appropriate tests. The reaction was of shorter duration than in the case of a chronic infectious mastitis exacerbation.

Other evidence supporting this general idea was to infuse the *Strep. agalactiae* bacterin in cows naturally infected with this organism, but during the remission stage when a most acute exacerbation occurred within a few hours, thus showing that the gland in this case had become sensitized to the natural infection. Studies of the antibody level and the *Strep. agalactiae* numbers in the milk in natural infection showed that immediately following an exacerbation the antibody level was high and the bacterial numbers were low. During the remission the antibody level continued to drop and when near zero, bacterial numbers increased enormously, accompanied by the exacerbation.

Since that time many scores of substances have been infused into cows' udders to study the antibody production against them. These include both pathogenic and non-pathogenic of both human and animal origin; fungi, animal and plant tissue, and viruses. Except for some viruses, all have stimulated antibody production in the udder and have sensitized the glands as shown by the reaction to subsequent infusions. Incidentally, whenever the bacterins contained toxins such as *Salmonellas* there is a prompt severe glandular reaction to the initial infusion.

The next observation that contributes to the better understanding of the etiology of chronic mastitis is that of local reaction in sensitized glands to the intramuscular injection of the bacterin. This reaction has been frequently observed in cases where one or more quarters have been sensitized to *Sal. pullorum* by intramammary infusion and subsequent intramuscular injections of the same bacterin.

On the basis of these studies, theoretically one could expect that the udder could be sensitized to a feed stuff and that mastitic flare-ups would occur when such feeds are ingested. Investigation of a number of claims that cows "flared-up" with mastitis when either corn or soybean meal was fed failed to show such relationship.—*W. E. Petersen, D.V.M., University of Minnesota.*

Productive Health

Why do misunderstandings occur between veterinarians, feed manufacturers, and the accounts they both serve—livestock farmers?

Failure to appreciate the complexity of the stress phenomenon and the important nutritional changes which it produces is certainly one of the big stumbling blocks. The reliable feed manufacturer knows that

he has formulated according to the recommendations of the National Research Council, the feed control officials of the states in which he operates, and the Food and Drug Administration of the United States. He must always remember, however, that these recommendations and requirements are for normal animals, which seldom enter into a controversy.

The careful practicing veterinarian, on the other hand, judges from the findings of his examination. He bases his opinion, his diagnosis, on what he can learn from the condition of the patient—and he sees the patient only because it has reacted to some unfavorable condition to such a degree that the harmful results are readily apparent to the owner or caretaker, possibly having been evident for several days.

The veterinarian and the feed manufacturer must both realize that the veterinarian sees the patient only under conditions of unusual stress, and that his findings must be accepted from that point of view — which is probably distorted to a considerable degree.

Failure to get a direct exchange of ideas is another obstacle. The veterinarian discusses the problem in rather technical medical terms with the owner, who has little knowledge of such terms. The owner relays the message to the feed manufacturer or his representative, always giving himself full credit for having made no mistakes in management or feeding practices, and for complete understanding of what the veterinarian said. The feed manufacturer subconsciously translates general statements into specific details of his own technical field. This is not good; the animal owner should not stand between the veterinarian and the feed manufacturer as an interpreter for both.

Direct contact between veterinarian and feed manufacturer will surely reduce differences. If this contact can be achieved before a troubled animal owner has generated animosity by misinterpreting, or by quoting incorrectly, each will learn the language of the other more quickly and more accurately.

The discussion, so far, has been developed on the basis of "the reliable feed manufacturer," and "the careful practicing veterinarian." We must recognize, however, that some feed manufacturers have formulated and sold feeds on a "minimum cost" basis, and have calculated this on margins so narrow that they do not allow for even mild stresses without some evidence of deficiency. Also, some practicing veterinarians have failed to keep abreast of the developments in feeding practices. A few of these still talk of feed being "too rich" and of "protein poisoning," but the number is growing smaller as accurate information gets to them.

Prevention of disease is much more profitable than treatment of sick animals.

A question for the feed manufacturers may be in order here. How often have you engaged the services of a veterinarian to help you outline or set up a program of disease prevention? How often have you suggested that an account do so? Very few have ever done so, and yet we hear frequently that the veterinarian is interested only in treating sick or injured animals, not in preventing troubles. This opinion prevails because these are the veterinary charges which are paid individually and personally. But who organized the program and did the work in reducing bovine tuberculosis and brucellosis? Who developed the vaccines and serums to check the losses from hog cholera, encephalomyelitis of horses, rabies of dogs, and enterotoxemia of lambs?

The veterinarian has long been both interested and active in promoting health, as well as in treating sick and injured animals. The code of ethics of the profession has tended to curtail the promoting or advertising of these interests and abilities. But where an interest has been shown or a need has arisen, a veterinarian has been found to render the service. Specialized abilities are the result of extra training, sometimes years of it, and they must command comparable fees.

The state of productive health of livestock is a result of adequate nutrition, absence of disease, and avoidance of excessive or numerous stresses exerted simultaneously. — *R. C. Klussendorf, D.V.M., Commercial Solvents, Terre Haute, Indiana.*

Books reviewed in this department and any other books, if available, may be obtained by remitting published price to the publisher.

Practitioner's Bookshelf

PHYSIOLOGY OF LACTATION, by *Vearl R. Smith, Ph.D.;* 291 pages. Iowa State University Press, Ames, Iowa. Price — $4.95

Recent advances in technics and apparatus have increased dairy scientists' knowledge about the physiology of milk secretion in dairy cows, especially regarding the biochemistry of lactation. These advances, plus other up-to-date facts and theories, are published in the new, revised edition of *Physiology of Lactation* by Iowa State University Press.

Professor Vearl R. Smith, head of the department of dairy science, University of Arizona, is author of the revised edition of this highly-regarded textbook — published for over 20 years under the title, *Secretion of Milk.* Professor Smith, co-author of earlier editions, with Dwight Espe, has had nearly 20 years' experience in teaching and research. He was formerly professor of dairy husbandry at the University of Wisconsin, and he has authored or co-authored more than 40 technical articles pertaining to the physiology of cattle.

While recent developments within the field were the main reason for the revision, all chapters, as well as the bibliography for each chapter were revised extensively to keep text and citations pertinent and concise. Additional illustrations have been added for better presentation of the material.

Included in this revised and expanded edition are: the physiology of milk production, the physiological factors influencing the secretion of milk, hormonal interrelations in lactation, the physiology and mechanics of milking, the effect of amount and kind of feed on amount and composition of milk, and the environmental factors affecting lactation.

LAW FOR THE VETERINARIAN AND LIVESTOCK OWNER, by H. W. Hannah, B.S., LL.B., and Donald F. Storm, B.S., J.D.; 196 pages. The Interstate Printers and Publishers, 19-27 North Jackson Street, Danville, Illinois. Price — $6.00

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Nutrition Award to McCrea

Dr. James A. McCrea, practicing veterinarian in Platte City, Missouri was honored at the annual banquet of the Veterinary-Nutrition Conference last month for his work in the field of veterinary nutrition.

Doctor McCrea is a graduate of the University of Missouri, School of Veterinary Medicine. He is a member of the governing Board of the Missouri Veterinary Medical Association, is active in civic groups, and has assisted in the organization of the veterinary-nutrition conferences and in the five regional meetings held this year on the subject.

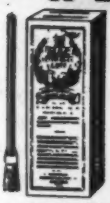
Pitman-Moore Expands

A $1,500,000 tissue culture center, to be built at the Pitman-Moore Company biological laboratories near Zionsville, was announced recently. Because of special features, many of which are based on recommendations by outstanding scientists and new requirements of the U. S. Public Health Service, it will be the first of its kind in the country. It will house the development and production of biological products utilizing the tissue culture method.

Although the procedure has been a research "tool" for several years, one of the first and most outstanding utilizations of tissue culture was Salk polio vaccine in which virus for production is grown on monkey kidney tissue.

Pitman-Moore Company, a major supplier of Salk polio vaccine, is now producing the largest line of tissue culture products in the biological and pharmaceutical industry with three already on the market and several in the clinical evaluation stage.

M·A·C



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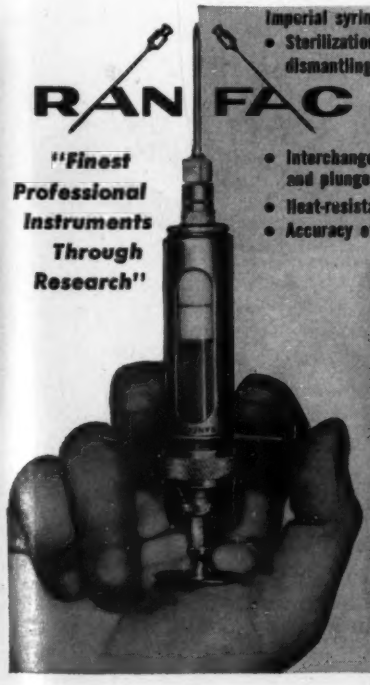

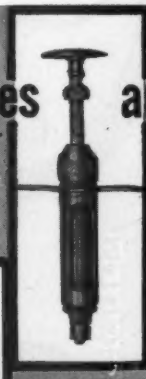

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This popular syringe eliminates danger of breakage by allowing sterilization without dismantling. The syringe is precise and accurate at all times, the barrels and plungers being interchangeable within their respective sizes.

Imperial Vik-O-Matic . . .
This new syringe has all the features of the Imperial Viking with the Vik-O-Matic unit added for accurately calibrated repeat doses. One hand operation. Dosage Regulator insures exact and constant volume delivery. Size 5-10 cc.

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PROFESSIONAL PRODUCTS DIVISION HILL PACKING COMPANY, TOPEKA, KANS.

Abbott Buys New Land

Abbott Laboratories announced last month the purchase of an additional 80 acres adjacent to its present 220-acre research farm south of Mundelein, Illinois. The additional land lies along Oakwood Road, just east of the present property. It includes two dwellings and other farm buildings.

The research work of the farm is tied closely to that of the scientific staff at North Chicago. Laboratory compounds which show promise in the field of animal health and nutrition are sent to the farm for experimental trials. If they show usefulness there, they go to leading veterinary or agricultural colleges for more exhaustive clinical trials.

Present studies are primarily concerned with growth stimulants, hormones, anti-infectives, tranquilizers, animal feed nutrients, and other products designed to contribute to the advancement of agriculture.

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ANIMAL CARCASS CREMATION

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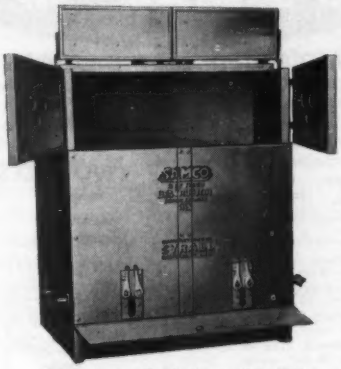

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William H. Boynton, D.V.M.
1881 - 1959

Dr. William H. Boynton died in Berkeley, California, November 10, 1959. He was 78. His life was devoted to research which was responsible for many advances in veterinary science. His contributions were particularly significant in the study of such diseases as rinderpest, anaplasmosis and hog cholera. In addition to his scientific achievements, he was an accomplished photographer, an expert pistol marksman, an avid and expert fisherman and, during his undergraduate days at the University of California, a rugged and determined football fullback.

Doctor Boynton attended the University of California form 1903 to 1906 and then went to Cornell to study veterinary medicine. He received his D.V.M. degree in 1908 and stayed on there for two years as an instructor in pathology. He then went to the Philippine Islands with the Philippine Bureau of Animal Industry and was engaged in the production of biological products for the control of rinderpest in

tested medicinals direct by mail

10cc Procaine Penicillin — Aqueous Suspension 300,000 Units per cc Standard Brand Expires February 1960	10 Vials	$ 2.80
	100 Vials	22.00
	1000 Vials	200.00
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		40.00
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	10 Vials	22.00
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	100 Vials	52.00
	1000 Vials	480.00
100cc PFIZER Combiotic expires January 1962	1 Vial	3.90
	5 Vials	19.00
	10 Vials	35.00
	100 Vials	330.00
Stearone IM PFIZER	10 Vials	32.50

Bacitracin Topical Ointment 1 oz.	12	$ 12.00
	24	21.60
	72	50.40
½ oz. Pfizer	24	15.60
	48	28.80
	72	36.00
Penicillin Tablets — Soluble — 200,000 Units	100	2.00
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	1000	17.00
5cc Acth-Gel — 40 units per cc Standard Brands	1 Vial	2.50
	10 Vials	22.50
100 Stearone 5 mg.		7.50
5 x 100 Stearone 5 mg.		35.00
Prednisone 5 mg.	100	2.25
	1000	20.00
	5x1000	95.00
Prednisolone 5 mg.	100	2.50
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nationally known antibiotics, therapeutics, hormones, biologicals, vitamins and pharmaceuticals for all animals

cattle. He remained in the Philippine Islands from 1910 to 1924 and during that tour of duty served as dean of the veterinary school and also held the position of chief of the Research Laboratory of the Bureau of Agriculture from 1918 to 1924. His research work on rinderpest in the Philippine Islands resulted in the development of the first successful rinderpest vaccine prepared from inactivated virus.

He was appointed professor of veterinary science at the University of California in 1924. He immediately began his work with hog cholera with the goal in mind of developing a vaccine for the immunization of pigs against that disease without the necessity of having to use virulent hog cholera virus. This work resulted in the development of the revolutionary hog cholera vaccine (Boynton's tissue vaccine) prepared by inactivating the virus in selected tissues harvested from hog cholera infected pigs. This vaccine immunized pigs successfully and avoided the disadvantages of the use of virulent hog cholera virus. This type of vaccine has been continuously available in the United States since 1940.

Doctor Boynton made the first diagnosis of anaplasmosis in the United States and did much to characterize that disease. His research also contributed materially to our understanding of its transmission, particularly as to the importance of wild deer as carriers and the importance of ticks in transmission.

His work with hog cholera since 1945 has been devoted to the cultivation of hog cholera virus in tissue culture and he was the first to grow virus by this method in sufficient quantity for practical application of that method in the production of hog cholera vaccine. He was also able to modify hog cholera virus by serial passage in tissue culture. This modified virus and his method of its propagation in tissue culture has been used in the preparation of a commercially available live cholera virus vaccine since 1953. Even after his retirement in 1949 from the University of California, he has continued his work with hog cholera research as Professor Emeritus and spent time in his laboratory working with his cultures on the day of his death.

Pacific Group to Meet

Seven nationally known figures who are allied with the veterinarian profession, will be speakers at the Pacific Northwest Veterinary Associations Conference at the Benson Hotel in Portland, February 4, 5 and 6. The speakers will include: Dr. Sam Scheidy, president, American Veterinary Medical Association; E. L. Peterson, assistant secretary for USDA; Dr. Rue Jenson, dean, School of Veterinary Medicine, Colorado State University; Dr. J. A. Archibald, editor-in-chief, Canadian Veterinarian Journal; Dr. Herb G. Stoenner, senior veterinarian, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Montana; Dean E. C. Stone, College of Veterinary Medicine, Washington State University; Dr. Werner Heuschele, director of the San Diego Zoo.

Kester to Foundation Post

Brig. Gen. Wayne O. Kester, past president of the American Veterinary Medical Association, has been named Director of Professional Education by the Morris Animal Foundation, Denver, Colorado. In the newly-created position, General Kester will serve as liaison officer between the Foundation's Board of Trustees, the veterinary colleges and the veterinary profession.

Mammary Nocardiosis

During a recent dairymen's meeting, the question of bovine mammary nocardiosis was raised. The Nocardia organism belongs to the group of fission fungi, aerobis, acid-fast and during the years has been variously described in connection with a form of lymphangitis or lymphadenitis, with pulmonary tuberculosis-like conditions. Some infected individuals are said to react to tuberculin, but an extensive scanning of current literature makes no mention of mammary involvement. The raised question then remains unanswered, though a tentative conclusion is that it has not been observed.—*R. R. Dykstra, D.V.M.*

This department will announce each issue new therapeutic items, equipment, services, and literature of interest to veterinarians. All claims made are those of the firms concerned. Send communications to the address noted.

Reader's Service

The Sprayon Jet-Pak is recommended for general clinical use in the application of drugs, cleaning solutions, protective coatings and the like. It is used with antiseptics for skin sterilization, with topical anesthetics, with private formulations in great variety. Jet-Pak is also used with aerosol solutions in room sterilization. The Jet-Pak is distributed through normal trade channels. The complete unit (spray head, jar, propellent can) is listed at $3.95, refill propellent can at $1.79. Extra jars are available, allowing the user to keep a number of different solutions on hand ready for instant use. Further information may be had from Sprayon Products, Inc., 2075 East 65th St., Cleveland 3, Ohio.

Welcoming Your Puppy is a booklet now being made available to dog breeders by the Gaines Professional Service Department. The booklet carefully coaches the new owner on everything about integrating the puppy into the new home with special emphasis on the all-important "firsts"—first feedings, first house training, first care, first exercise and obedience lessons. Requests for copies of this booklet should be made to Gaines, 275 Cliff Street, Battle Creek, Michigan.

Fur Damage is a booklet that covers the subjects of fur-chewing and other fur damage, giving the many theories and treatments that have been pursued over the years in order to solve this baffling problem. Other publications entitled Dermatomycoses of Chinchilla and Enteritis in the Chinchilla are also available. Veterinarians who wish free copies of these publications should request them from NCBA, P.O. Box 145, Middletown, New York.

The latest addition to the **Silent Partner Program** has been announced. It is entirely different from anything ever marketed. The plan-type itself has been tested and received over 40% participation by the International College of Surgeons and the Southern Medical Association. The plan provides $10,000 insurance for the member; premiums are exceedingly low for every age bracket, and for the first time, full family protection is available at the option of the veterinarian. Conversion privileges make the policy flexible and guarantee future insurability. For details, check with Silent Partner Associates, Box 824, Evanston, Illinois.

Midicel Acetyl Suspension designates a liquid sulfa compound effective against a variety of bacterial infections which was recently introduced by Parke, Davis & Company. It is effective in those infections responsive to sulfonamide therapy, including respiratory infections, surgical and soft tissue infections and bacterial dysentery. Its use for human beings has been on a prescription basis to date.

Immunization Information for International Travel is a booklet that has been revised recently and is a must for international travelers. For a copy of this booklet write the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Send 30 cents for each copy desired.

A new **Six-species Coccidiosis Vaccine** which includes the species *E. brunetti* has been made available to the profession. Called CocciVac Type B, the new vaccine protects chickens against coccidiosis caused by *E. tenella, E. necatrix, E. acervulina, E. hagani* and *E. maxima,* as well as *E. brunetti.* For details check with Dorn & Mitchell Laboratories, 205 East 42nd Street, New York 17, New York.

A New Price Catalog of essential oils, aromatic chemicals and specialties, and certified colors is now available from Dodge & Olcott. This 36-page booklet is published semiannually and includes short descriptions and uses of various products, as well as addresses and phone numbers of the various branch offices. Copies are available upon request to Dodge & Olcott, Inc., 180 Varick Street, New York 14, New York.

Aluminum Castration Knives are being made available to the veterinary profession in connection with a special promotion designed to sell Pigdex, the injectable iron that stops baby pig anemia. Retailing at $1.19, a castration knife is given free with a purchase of one-half dozen ten dose vials of Pigdex, or one 50 dose vial. For details check with American Cyanamid.

Kold-Pak is a portable, packaged remote supply of refrigeration providing low temperatures to —120 F. There are 12 models in the standard Kold-Pak line with direct expansion types and brine chillers. For information, address Tenney Engineering, Inc., Union, New Jersey.

Atlas

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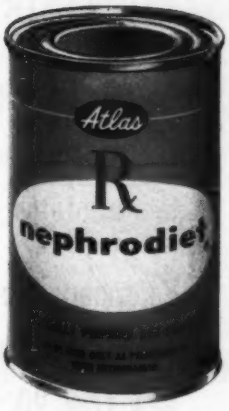

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This product, developed by Dr. L. W. Slanetz and associates at the University of New Hampshire for the control of staphylococcal mastitis*, now is available to the veterinary profession.

For further information, please drop a card to the address below or ask your local Cyanamid representative for details.

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*Journal A.V.M.A. 134:155-161 (Febr. 15) 1959

Loss Prevention Year

Authorities this month checked results of National Livestock Loss Prevention Year, just closed, and they added up to some good news both for the veterinarian and the livestock industry.

Literally thousands of columns have been devoted to the project by the nation's newspapers and farm magazines. Month after month, many farm magazines across the country devoted full page features to the campaign, and a number of leading livestock and affiliated groups cooperated as well. Thousands of hours, also, have been spent by radio and television stations in beaming the Loss Prevention Year material.

"This has been the largest, single, coordinated program ever conducted on behalf of the practicing veterinarian and better animal health," reports a spokesman for Associated Veterinary Laboratories, whose member companies underwrote the project.

The campaign to educate animal owners focused, month by month, on major disease hazards, and pointed up the value of calling in the veterinarian to deal with these problems.

Doctor Melles Succumbs

Dr. Leonard H. Melles, supervisor of the sales force at Corn State Laboratories, died suddenly after suffering a heart attack at Omaha. He was 48.

Born in Weir, Holland, Doctor Melles received his college training at Morningside College and Iowa State College. He had practiced for ten years at Paullina, Iowa before joining Corn States. He served as a captain in the Veterinary Corps during World War II.

William Youatt

Youatt (1777-1847) was one of the most practical and outstanding veterinarians of his day and an accomplished writer. He attended the London Veterinary College, but never graduated — *Kenneth B. Haas, D.V.M.*

Laboratory Service for Veterinarians

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These laboratories have been established to aid veterinarians in the diagnosis of obscure as well as common ailments in large and small animals. The chief aim of our staff is to give quick and accurate diagnosis at all times.

Our service includes fecal examinations, anti-biotic sensitivity tests, urinalyses, blood counts, tissue sections, bacteriological cultures, cultures for ringworm and blood chemistry. It is designed to assist owners and breeders of stock of all kinds including dogs, cats, horses, cattle, poultry, hogs and sheep.

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Excellent for immobilizing, capturing, restraining or treating wild or feral animals.

Effective for animals of all sizes. From one to ten milliliters of any liquid compound can be injected into an animal from distances up to approx. 50 yards.

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Proud owner Barbara Clausen is shown beside Black Orbit, 17-month-old Angus steer judged Grand Champion Steer at 1959 Illinois State Fair.

It was "no contest" at the 1959 Illinois State Fair as Black Orbit, 1000-lb. Angus steer, easily won the Grand Champion Steer ribbon. "Orbit" was raised from birth and shown by Barbara Clausen, 17, of Manito, Illinois. As suggested by her veterinarian, Barbara has included VpC RIBAD II in "Orbit's" rations since he was a few weeks old. VpC RIBAD II is an ideal supplement for all livestock and poultry. For top supplement results, recommend highest quality VpC RIBAD II to your clients.

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Kansas Business Conference

A veterinary medicine business conference was held on the campus of Kansas State University, December 19, according to Dr. E. E. Leasure, dean of the K-State School of Veterinary Medicine.

Topics for discussion included The Veterinarian and Social Security, by John H. Cooter, district manager of the social security administration, Topeka; The Use of Credit Bureau and Billing, by Raymond Algott, manager, Credit Bureau, Manhattan; Federal Income Tax, by Donald Clingenpeel, audit division, internal revenue service, Wichita; Veterinary Public Relations, by Ab Quin, Jensen-Salsbery Laboratories, Kansas City, Missouri; Your Will, by Ambrose Johnson, attorney, Manhattan; The Veterinarian in a Commercial World, by Jim Davis, Jensen-Salsbery Laboratories, Insurance and Liability, by Keith Hayes, Charter Life Underwriters, Mutual of New York, Wichita; and Evaluation of a Practice, by Warren J. Kilpatrick, veterinary practitioner, Mediapolis, Iowa.

Dr. E. J. Frick, head of veterinary surgery and medicine at K-State, presided at the morning session of the meeting and Doctor Leasure, who is president-elect of the American Veterinary Medical Association, gave the purposes of the conference.

Fromm Adds New Building

Fromm Laboratories, Inc., Grafton, Wisconsin, are constructing a large addition to their building in which desiccated vaccines are produced. The expansion was necessitated to meet the increasing demand for these vaccines.

Due to the rapid growth of Fromm Laboratories, Inc., two new wings are in the planning stage for another building in which serums, inactivated vaccines and large animal biologicals are produced.

INJURED TEATS
SCAB TEATS
STENOSIS
POST-OPERATIVELY

To maintain unrestricted milk flow and provide medical antisepsis are of prime importance in treating teat troubles. Dr. Naylor Dilators accomplish these 2 objectives specifically with this 2-WAY ACTION:

1. MECHANICAL ACTION . . . gently supports sphincter and teat mucosa—keeps teat open and promotes easier, natural milking. Positive retention in small or large teats.

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WITH ANTIBIOTICS . . . Saturated with your favorite udder infusion antibiotic, Dr. Naylor Dilators are an ideal vehicle for additional local medication following teat surgery.

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Dr. Naylor
Medicated Teat Dilators
SUPPLIED:
Dispensing vials—16's
Labled packages—42's

Animal Care Panel Meets

The presentation of the 1959 Charles A. Griffin Award, the election of officers for the forthcoming year, and reports ranging from Animals in Space and Use of Laboratory Animals in the Food and Drug Ad-

ministration to Genetics of Laboratory Animals for the Future and Design of Animal Quarters, highlighted three days of technical discussion at the 10th annual meeting of the Animal Care Panel, held in Washington, D.C., October 29-31.

More than 750 medical investigators, supervisors of laboratory animal colonies, veterinarians, animal caretakers, technicians, animal breeders, and laboratory equipment suppliers from the United States, Mexico, Canada and Great Britain attended the three-day meeting.

The Charles A. Griffin Award for 1959 was presented to Robert D. Henthorne, D.V.M., in recognition of his outstanding contribution to the field of disease control of laboratory animal colonies.

The uses of research animals in space medicine, the research possibilities offered by genetically controlled laboratory animals, and the possibilities of modifying genetically controlled laboratory animals for specific purposes were among the reports given by outstanding authorities.

Officers for the forthcoming year are: Dr. Bennett J. Cohen, D.V.M., Ph.D. (left), Director of the University of California, Los Angeles, Medical Center Vivarium, was re-elected as president for 1959-60.

Dr. Melvin M. Rabstein, D.V.M. (center), Chief, Animal Farm Division, Biological Warfare Laboratories, Fort Detrick, Maryland, was elected vice-president.

Re-elected as secretary-treasurer was Dr. Robert J. Flynn, D.V.M., Argonne National Laboratory, Lemont, Illinois.

The Animal Care Panel, founded in 1950, is a nonprofit educational association of persons and institutions professionally engaged in the production, care, and study of laboratory animals, devoted entirely to the exchange of technical information in this vital area.

Its quarterly publication, the *Proceedings of the Animal Care Panel*, contains papers presented at the annual convention, as well as other papers of interest to workers in the field of laboratory animal care.

Other activities of the Animal Care Panel include the distribution of moving pictures for technician training, advisory services on animal care, maintenance and utilization, and cooperation with other organizations concerned with laboratory animal supply and quality. Address correspondence to Box 299, Lemont, Illinois.

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McDonald Joins Hill Packing

Dr. Quentin F. McDonald (ISU '49) has been named Veterinary Medical Director of the Professional Products Division for Hill Packing Company, Topeka.

Dr. Quentin F. McDonald

His work will consist primarily of directing the professional and technical field work for the Prescription Diet line of products. His previous experience includes general practice, field sales and clinical research work in the pharmaceutical industry.

Distemper, Rinderpest, Measles

Canine distemper, rinderpest and measles viruses may all be evolutionary descendants of a parent pathogen of carnivores ungulates and man respectively, according to Polding, Simpson and Scott, writing the September 19, 1959 issue of Veterinary Record. The hypothesis is based in a measure on the observation that dogs constantly exposed to rinderpest virus remain free from canine distemper. Also, there appears to be a linkage between measles (human) virus and canine distemper virus because of cross-neutralization between the two. Some dogs given a single subcutaneous injection of rinderpest virus experimentally became refractory to canine distemper virus. On the other hand, in cattle canine distemper virus had no effect in raising resistance to rinderpest.—*R. R. Dykstra, D.V.M.*

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in the Puncture Proof Sterile Blade package that can be autoclaved.

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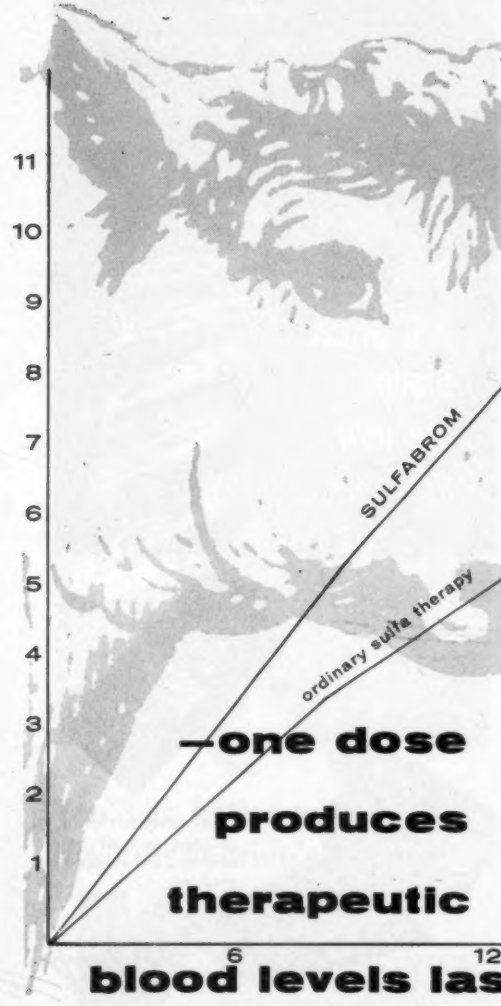

More than any other professional man, the practicing veterinarian knows that his most valuable asset is time. In any area of his practice, the success of his therapy cannot be measured by results alone; he is a busy man whose time must be used judiciously.

Well aware of this problem, Merck research workers have designed an antibacterial agent which, from its conception, was meant to satisfy the particular needs of the veterinarian. In cattle, this new drug produces effective therapeutic blood levels for at least two days, freeing the veterinarian from time-consuming return calls and minimizing stress-producing handling.

The most exciting development in sulfa therapy in 20 years

SULFABROM gives you all the benefits of sulfa efficacy and at the same time helps eliminate the necessity for frequent administration. Thus, SULFABROM is economical—your initial expenditure is sulfa-low and decreased total dosage brings cost down even lower.

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The Need for Leadership

The general public knows very little about veterinary medicine and we have done a magnificient job of "hiding our light under a bushel." The obsolete idea was that we should never tell anyone anything about our profession lest they find out our trade secrets and capitalize financially from them. Many, many veterinarians still cling to this idea and until such individuals are re-educated or leave the profession, we cannot go forward.

The above being true, we need then, it seems, to look at our present curriculums and examine closely what needs to be done in order to develop the talents necessary to communicate to the public our position in relation to the needs of society today.

Modern veterinary medicine is a legitimate professional business, having three specific and important services to offer to the general public:

First, veterinary service rendered either in a veterinary hospital or at the farm or home.

Second, preventive veterinary medicine.

Third, public health services, such as federal, state and municipal inspection of meat, milk, etc.

There are many other areas in which graduate veterinarians are finding successful and essential services to perform, and we in the profession must expand our ideas and offer our help to liaison areas in order that we meet the needs of society. If we meet these needs well and discharge our duties with honor, then we should publicize our position and develop a program of successful public relations that will inform, and create good will among the general public.

If we as a professional group stand four square on honesty, integrity and services rendered for value received, we can hold our heads high, and fill the need that requires our professional training.

We, then, should let the public know what we can accomplish and are accomplishing. Leadership is a reward that first must be earned. If we as a professional group are sincere, honest and truthful we shall be given that reward by the general public.—*The Southeastern Veterinarian, 9:199, 1959.*

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"Jumbolus"

Sulfonamides combined with accepted coagulants, adsorbents detoxicants and antacids
For the treatment of diarrheas in larger calves and adult cattle

Phthalylsulfacetamide (30 gr)—sulfonamide of choice in enteric infections
Sulfathiazole (30 gr)—routinely used in treatment of scours
Akrodin® (60 gr)—widely used in treatment of bloody scours
Magnesium trisilicate (60 gr)—a preferred detoxicant, adsorbent and antacid
Tannins (100 gr)—adsorbent and coagulant, essential in reducing fluidity of stool
Alumina gel (100 gr)—adsorbent, coagulant, detoxicant and antacid

Suggested dose: 1 **AKRA-SCOUR** "Jumbolus" per 350 pounds body weight (3 per 1000 lb.) the first day, and 1 per 500 pounds the second day. Continue or repeat as necessary.

Fits usual "equine" balling gun. Creased for fractional dosage.

Package: Box of 50 "Jumboluses"

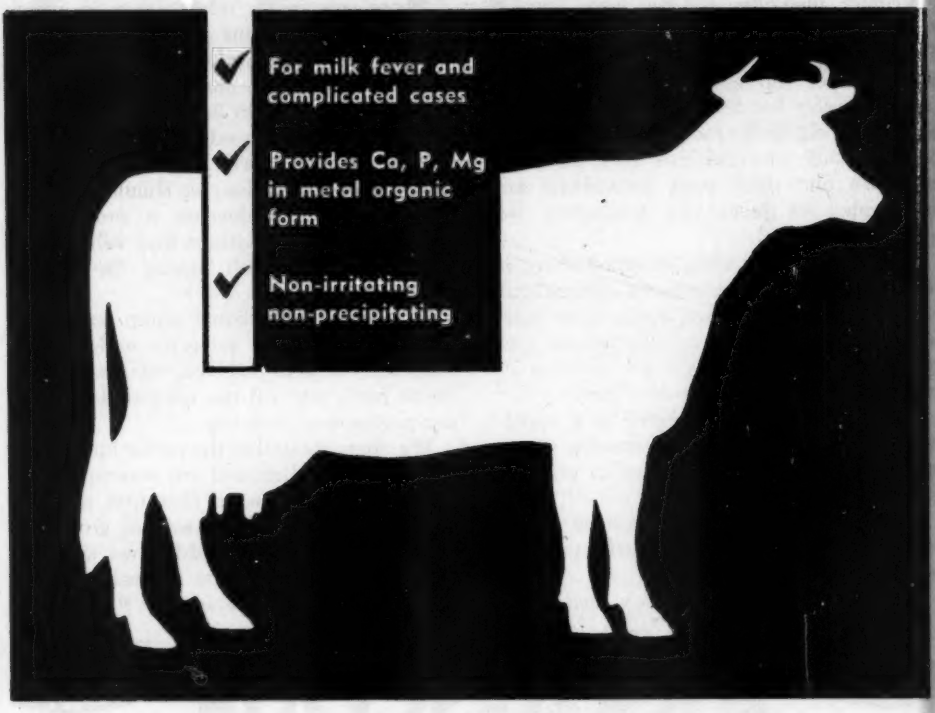
order from your nearest CURTS distributor or direct

CURTS Laboratories, Inc.

Feature Formulations — For Veterinarians — Since 1918

71 Central Avenue Kansas City 18, Kansas

NORCALCIPHOS



Slower ionization means extended action in milk fever therapy

Norcalciphos provides extended therapeutic action against milk fever. In NORCALCIPHOS, calcium, phosphorus and magnesium are in metal-organic form. This means slower ionization, better controlled pharmacological action and less irritation than formerly possible with old-style inorganic compounds.

Especially indicated in complicated cases, the balanced formula of Ca, P, Mg and dextrose in Norcalciphos is also valuable in problem herds to help prevent relapses. And because Norcalciphos is exceptionally stable, there is no troublesome precipitation to slow treatment, even after freezing.

Supplied In: Doz. 500 cc.

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